

I/O NEWS

THE OFFICIAL PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF CROMEMCO USERS

Volume Six, Number Two

IMS by APTC
68Kalc Tutorial
1987 IACU Survey & SIR

Single Copy Price \$10.00

Faster, Higher-Capacity Disks And Tapes With New "ESDC" Interface

Cromemco has introduced a new interface card that supports the newest generation of high-speed, high-capacity Winchester disk drives and cartridge tape drives. The card achieves this by supporting the new ESDI standard for disk drives and the SCSI standard for tape drives. The card is called the ESDI and SCSI Device Controller, or "ESDC."

The ESDI (Enhanced Small Disk Interface) standard is the new high-speed standard for high-capacity 5-inch Winchester disk drives. The ESDI data transfer rate is a blazing 10 megabits per second, **twice as fast** as the current ST-506 standard. This means that Cromemco systems using the new ESDC card and an ESDI disk drive will read and write to the hard disk at twice the speed of earlier systems.

In addition to higher speed operation, the new ESDI disk drives offer higher storage capacities. Cromemco currently supports a 175-megabyte 5-inch ESDI

disk drive, and will be announcing support for both a 380-megabyte and a 760-megabyte drive within a few months. Amazingly these high-capacity drives are the same physical size as Cromemco's current 5-inch, 150-megabyte disk drive.

Each ESDC card can drive two ESDI devices and up to four ESDC cards can be configured in a system. With the 760-megabyte disk drive this means that Cromemco systems now have the potential to support **over 6000 megabytes** of on-line disk drive storage!

The SCSI (Small Computer System Interface) port on the ESDC card is just as exciting as the ESDI port. A large variety of computer peripherals now use the SCSI interface, most importantly the new generation of quarter-inch cartridge tape drives.

A new cartridge tape drive, the

Continued on page 5

Moving From dBASE II To Informix

by Robert Peterson,
M.D., Ph.D.

Database applications have been a focus of our information center for record keeping and report writing since we began with a Cromemco System 2, CDOS/floppy based system. Back in those days DBASE II was a convenient software package that met virtually all our needs. As we moved to Cromix and a hard-drive, performance increased; however, in those days a single secretary entered all data and edited records in a single user environment. Today we use a 68000 Cromix Plus system with several users all wanting access to the same data for additions, editing, queries and regularly scheduled reports. DBASE II, that marvelous software package under CP/M or CDOS

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Warecraft's 68Kalc A 68000 Cromix Spreadsheet

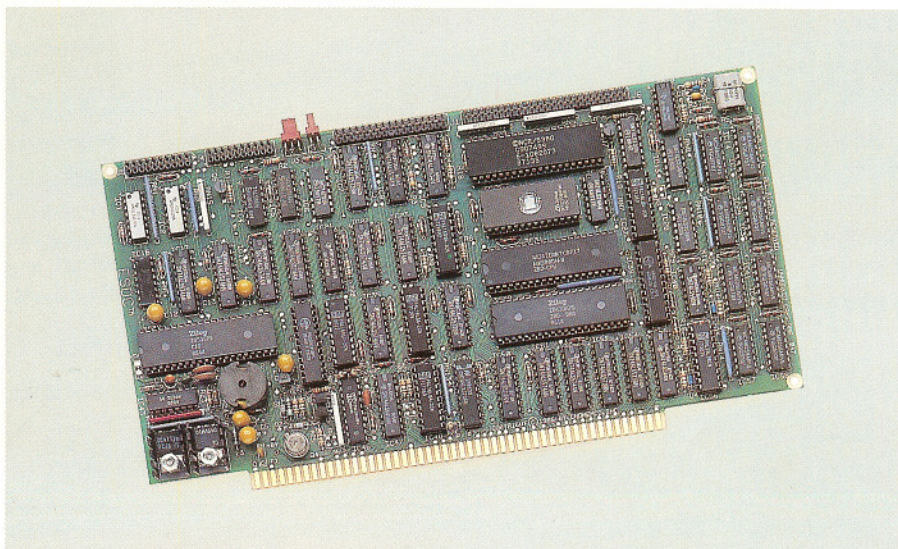
by Thomas N. Ronayne

First Impressions

I was asked if I'd take a look at Warecraft's 68Kalc—the first "real" 68000-based spreadsheet program I know of for Cromemco's Cromix-Plus operating system—and tell you what I think of it. I said I'd be happy to, and this is it.

I'm purposely writing this as I go so I can really capture my impressions as they occur, instead of sometime after the fact when I've figured something out or gotten used to some quirk (which is not to say that there ARE any quirks,

Continued on page 14



Finally!

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SALES	0	0	7500	17520	22545
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GROSS PROFIT %	0	0	72	72	71



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I/O NEWS

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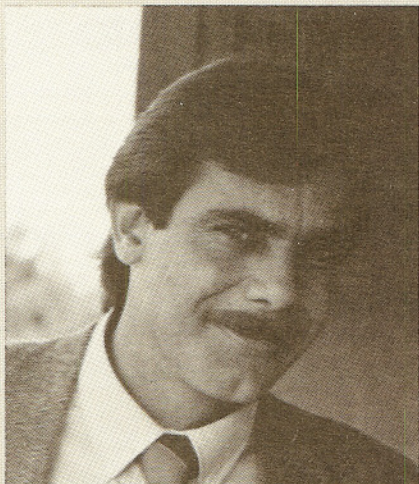
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Survey Results?

I had hoped to present a breakdown and analysis of the 1987 IACU General Survey for your reading pleasure in this issue. Unfortunately, our mail box was not inundated by returned surveys. It's hard to draw general conclusions based on 3% of the "IACU universe." For those of you that did complete and return the survey—many thanks; your comments and suggestions have been



Bill Jaenicke

very helpful. For the other 97%, I ask again that you please complete and return the survey on page 17. If we get a large enough response the survey results will be compiled and published.

In looking over the surveys that were returned a few things became strikingly apparent. For one, the average "responder" has been using Cromemco equipment for over five years. There are as many using CDOS as there are those using Cromix-Plus. In many cases, multiple systems were on site, with C-10's, S-100 CDOS, Z80 Cromix and Cromix-Plus all in operation. Not surprisingly, nearly everyone also reported IBM PC's or clones as being in their computer arsenal. Consequently, there were a number of suggestions to devote more editorial coverage to the PC—Cromemco interface. And so, in the issues to come, we will.

The feedback which the responders provided was helpful and a little unexpected. 28% (of 3%) found *I/O NEWS* to be "very useful"; 68% said it was "interesting only"; and 4% labeled it as "not useful." The immediate question that comes to mind is "what can be done to make *I/O NEWS* more useful?" Your input is requested.

The I/O Action-Pack

Our readers in the U.S.A. recently received a direct response card pack in their mail—the I/O Action-Pack. It contained a number of "mail-in" special offers from the advertisers that regularly appear in *I/O NEWS*. The mailing was limited to the United States (about 3600 card packs were mailed), but a number of extras were printed. We've included an Action-Pack in the envelope for this issue's mailing to our members in Canada, Mexico and Australia. Many of the postcards are Business Reply Mail, which means that no postage is necessary if mailed from within the U.S. Those of you in Canada, Mexico, and Australia will need to affix postage if you wish to mail the cards back.

The I/O Action-Pack was something of an experiment, and as such we would be very interested in what your impressions were. We also hope that you'll use the cards to contact those companies who have products or services that you

may need, either now or in the future.

This Issue

One suggestion that kept cropping up



Lisa Jaenicke

on the IACU Surveys we received was for more product information and reviews. So we're especially pleased to be able to comply with that wish.

Cromemco's new ESDC interface card is showcased on the front cover. It represents yet another leap in system performance available to Cromemco users. More speed. More storage capacity. An upgrade option which can be "plugged in" to open the door to the new generation of high-speed and high-capacity disks and tapes. Will it ever stop? Not likely—that's the beauty of Cromemco computers.

Warecraft's 68Kalc spreadsheet for Cromix-Plus has also caused quite a stir. It's been a long wait but worth it. Two articles are presented that will fill in some of the details. Tom Ronayne's "Warecraft's 68Kalc—a 68000 Cromix Spreadsheet," affords us an unbiased, "off the cuff" first look at the product, written in Tom's own inimitable style.

And with Joseph Brother's "68Kalc—A Spreadsheet Tutorial," we get an even closer look at what it can do. It presents all the steps, keystroke by keystroke, to set up a functional checkbook register (with account analysis). The author is well qualified to write on the subject of spreadsheets—

New ESDC Card

Continued from front cover

he's responsible for writing 68Kalc and bringing it to Cromix-Plus users.

68Kalc also offers us something rare in today's world of corporately developed software for the masses. We have a chance to "put in our own two-cents worth"; to have some say as to the future enhancements and refinements that will be made to the program. There's plenty of room for growth; all that's needed is your support and your suggestions.


For those of you engaged in the manufacture and/or selling of goods, you'll want to read "APTC's Inventory Management System Product Highlights," by Tom Ronayne. And if the product you manufacture or sell is software, then you'll want to read this installment of "Winning at Copyrights," by Paul Hentzel. There you'll get step by step instructions for filling out a Copyright Office FORM TX for software copyright application.

"Moving From dBASE II to Informix," by Dr. Robert Peterson, describes a situation that many of us have faced or about to face. That's the uncomfortable realization that it's time to upgrade the software to keep up with the hardware. A primary hindrance to this migration is, of course, the vast amounts of precious data stored under the existing system. Dr. Peterson's article shows how, with a little ingenuity, this problem can be overcome. The result? Nothing lost; a whole lot gained.

Last, but not least, we're happy to announce the return of "Tec Tips." Rich Quinn is now settled in Texas, and found the time in his hectic schedule to write "everything you ever wanted to know" about the RS-232 serial interface. He also included the new, improved, and much longer list of ST-506 drives that can be interfaced with Cromemco's STDC controller, and their initialization parameters.

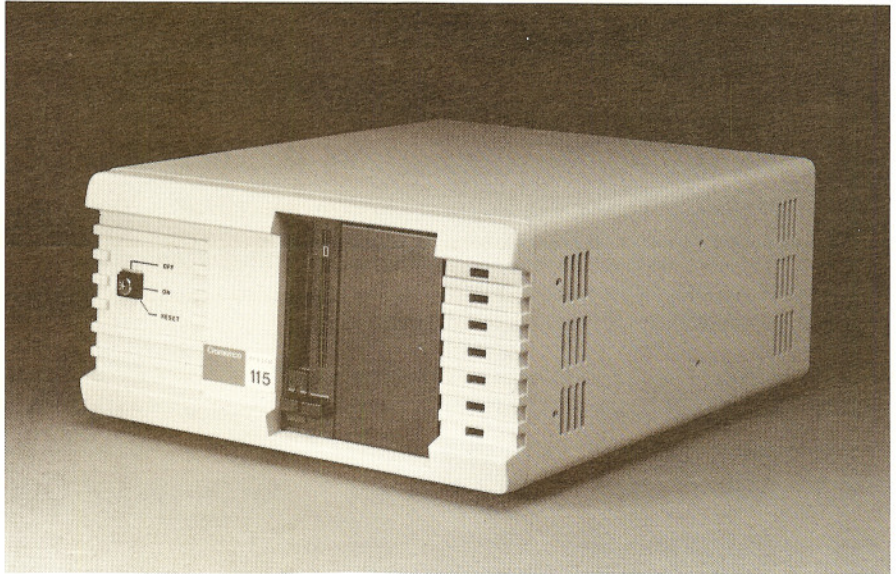
We hope you like it. We hope that it's useful. As always, we look forward to your comments, criticisms, and suggestions.

William E. Jaenicke
Editor & Publisher

P.S.— Don't forget to send in your 1987 IACU General Survey. 

CTD-60, is now available from Cromemco for use with the SCSI port on the ESDC card. The CTD-60 can store 60 megabytes of data on a DC-600A cartridge using the QIC-24 (pronounced "Quick 24") standard. The QIC-24 standard precisely defines the recording for-

uses the ESDC in place of the STDx, and a 175-megabyte ESDI hard disk in place of the 150-megabyte model. The CS420EH is a similarly upgraded version of the CS420 that also uses a 60-megabyte QIC-24 tape drive in place of the older model.



The CS-115 from Cromemco is its newest 68020-based 32-bit system. The system includes an integral 175-megabyte hard disk and 60-megabyte cartridge tape drive. The system also includes 2 megabytes of RAM and 8 serial I/O ports.


mat to store 60 megabytes of data on the DC-600A cartridge. By using the QIC-24 standard, a new and important method of data and program interchange is now available to exchange information with other Cromemco systems and with non-Cromemco systems as well.

An important feature of the CTD-60 is automatic read-after-write verification of data. The CTD-60 has separate read and write heads so that data can be verified immediately after it is written, without having to rewind the tape. This feature assures data integrity while allowing full-speed operation of the tape drive. A full 60 megabytes of data can be written or read in just 30 minutes.

Cromemco is offering software support for the ESDC under both the UNIX and Cromix-Plus operating systems. Drivers for the 175-megabyte ESDI drive and for the CTD-60 tape drive are included with the latest releases of UNIX V.2 and in both the XPU and XXU versions of Cromix-Plus. The ESDC will not be supported under UNIX V.0.

Cromemco has also announced special "EH" versions of its systems that utilize the ESDC card. The CS120EH is an upgraded version of the CS-120 which

In addition to the "EH" upgrades of the CS-120 and CS-420, Cromemco has introduced a new low-end model to its 68020 family of 32-bit systems. The new model is called the CS-115. The CS-115 is unique in that it has no floppy disk drive. In place of the floppy drive is a 60-megabyte tape drive. The CS-115 utilizes the tape unit not only for data back up, but also for program loading and data interchange. Cromemco will offer all of its 68020-based software on QIC-24 format DC-600A cartridges to support the CS-115 and future products. This will be a big plus when loading programs that now require multiple diskettes. Inside the CS-115, the new ESDC card replaces both the STDx and 64FDX cards, thus freeing up a system slot.

In short, the ESDC card is an interface that brings a significant new level of performance to Cromemco systems, and continues to keep the performance of Cromemco systems positioned well above that of the commodity computers in the market. The ESDC card has allowed Cromemco to extend both the low-end (CS-115) and high-end (CS-420EH) of its 32-bit family of systems and provides a means for existing users to upgrade to these new and exciting levels of performance. 



SOFT TOOLS

SOFT TOOLS is a regularly appearing column dedicated to UNIX and Cromix users. Its aim is towards simplifying the administration and maintenance of multi-user systems. It is edited by Tom Ronayne, President of Advanced Programming Techniques Corp. (APTC), P.O. Box 19549, Detroit, MI 48219, (313) 835-0808.

The newuser Shell Script

The newuser shell script, contributed to Dr. Rebecca Thomas' December, 1986 "Wizard's Grabbag" column in *UNIX/World* magazine by Tom Barrett of Benetics Corporation, Mountain View, California, is a UNIX way of doing what `passwd -n` does in Cromix; i.e., a quick and easy way of adding users to a UNIX system. I've modified Mr. Barrett's contribution a bit.

The /etc/passwd File

Both the Cromix and UNIX operating systems are shipped with a pretty fair set of system security tools—the `/etc/passwd` and `/etc/group` files. The macro purpose of these tools is to provide access to the system for people who are authorized to use it, and the micro purpose of these tools is to restrict authorized system users from accessing parts of the system that they aren't supposed to.

The `/etc/passwd` file is the "place-keeper" for an authorized user's log in name, encrypted password, user number, group number, home directory, and other information. In both operating systems, the `passwd` program adds, changes, and deletes passwords, and other programs consult both the `/etc/passwd` and `/etc/group` files to see if a particular user is authorized to "do something." The `passwd` program and the `/etc/passwd` file isn't identical in Cromix and UNIX, but its purpose is. A small comparison of the `/etc/passwd` fields and what they're for are shown in FIGURES 1 and 2.

The minor differences between the fields aren't important—the people who wrote the operating system determined what was going to be where in the `/etc/passwd` files, and you just get to use what they did. What is important, I've been finding, is the administration of the password and group files, and that's what we're going to talk about.

Cromix' documentation is fairly quiet about user and group numbers: other than the range (user 0—the **superuser** in Cromix—and user 32,767—user **bin** in Cromix), Cromix doesn't have a lot to say about user or group numbers, other than the obvious facts that user numbers should be unique and people

FIGURE 1: Cromix-Plus `/etc/passwd` File

User Name	Encrypted Password	User Number	Group Number	Home Directory	Auto-Start	Prompt
system	:uucgifyqrf	:0	:0	:/	:	:
unix	:ycr5rmxaqt	:0	:0	:/usr/unix	:boot uboot:	:
bin	:zzzvglmjnn	:32767	:32767	:/bin	:	:

FIGURE 2: UNIX System V `/etc/passwd` File

User Name	Encrypted Password	User Number	Group Number	Accounting Information	Home Dir	Program Name
root	:J59kCKi1298	:0	:0	:SuperUser	:/	:/bin/sh
rootcsh	:aljbeW098KL	:0	:0	:SuperUser	:/	:/bin/csh
daemon	:	:1	:1	:Daemon	:/	:
bin	:	:2	:2	:Bin	:/bin	:

in a group should have the same group number to be able to access each other's files if that's desired. UNIX, on the other hand (and typically), has definite requirements: the user number must be between 0 and 65,535—0 for the superuser—and user number's 0 through 99 are reserved. Group numbers are about the same: Cromix lets you use group numbers, and group number 0 is for the superuser; UNIX is more specific—group 0 is for the superuser, and groups 1 through 99 are reserved.

In my meanderings through the often confusing worlds of working in multiple operating systems, I've found that it's a pretty good idea to keep things as simple as possible and to keep them as common as possible. I've been finding that Cromix is a more elegant operating system than UNIX (it does a lot of the work for you; which makes it easier to use; which is what computers are for in the first place), but, at the same time, that elegance can let you get away with things you probably shouldn't be doing in the first place.

Looking at my own and customer's systems, I've found that password administration is, at best, a haphazard occupation. It's a lot easier to add a user in Cromix (you use `passwd -n`), and it seems that system administrators just

"throw a user number at it" without much rime or reason. I'm probably as guilty as anybody, which led me to this whole discussion after I had to "fix" a few that I'd messed up.

I'd always just "thrown" a new user account at a system—never gave much thought to a method. I've been finding, though, that the UNIX "model" for password administration is a pretty good one to use for sensible system administration. I found this out like I find out most things—the hard way—when I added the `newuser` tool to my UNIX system. (By the by, somewhere in the thousands of pages of UNIX documentation I've skimmed it says that you should add users in sequential order—but darned if I know where I read that.)

The .profile, .cshrc, and .login files

I keep "skeleton" `.profile`, `.cshrc`, and `.login` files in the `/etc` directory for the `newuser` shell to copy to the new user's home directory. By "skeleton" I mean that they contain all the basics I use on my system; e.g., `TZ`, `PATH`, `TERM`, `TERMCAP`, `stty`, and any other local shell variables. `newuser` adds the `SHELL` and `MAIL` variables for you, so I've isolated these files in `/etc`—and named them with the leading dot so they don't conflict with the existing `profile` and `cshrc` files in `/etc`.

Deleting Users

Here's the "good practice" way of deleting users from your system as people leave the company or change jobs: you shouldn't delete the login name from your `/etc/passwd` file; edit the file and change the password field from whatever encrypted password is there to a string of lower case x's (in Cromix, it's ten characters long, in UNIX it's thirteen characters long). There is no way that the decryption will ever match a string of x's.

A Word of Warning

If you, like I, have haphazardly added users to UNIX, `newuser` won't work until you make the effort to "fix" your `/etc/passwd` file: start with `/usr/guest`, who should be user 100 and group 100 (which is your "users" group), and go from there, one by one; i.e., the next user is user 101, then 102, and so on. I've "converted" all my own Cromix systems and as many customer's Cromix systems to this same scheme, following the UNIX model, and recommend that you give serious thought to doing the same. If you want to use the `newuser` shell script, you'll have to make sure that:

- the first user—usually `/usr/guest`—is user number 100, if it's `/usr/guest`, it should be group 100 (group "users" in UNIX);
- all later users are numbered in sequence; i.e., 102, 103, etc.

If you change any user numbers (you edit the `/etc/passwd` file), you should:

- `chown /usr/whoever /usr/whoever/*`
- `chown /usr/whoever /usr/.profile`
- `chown /usr/whoever /usr/.login`
- `chown /usr/whoever /usr/.cshrc` and
- `chgrp groupname /usr/whoever/*`
- `chgrp groupname /usr/.profile`
- `chgrp groupname /usr/.login`
- `chgrp groupname /usr/.cshrc`

Remember—this is important—DON'T change [system] or [bin] in Cromix, and [root], [rootcsh], [daemon], [bin], [sys], [adm], [uucp], [check], [lp], [usr68], or [who] in UNIX.

Using newuser

Using `newuser` is simple: to add an "ordinary" new user, say, "alf" to your system, you

- Log in as root (you must be superuser);
- enter:
newuser alf

and `newuser` will add alf to the `/etc/passwd` file, create `/usr/alf`, copy a .profile file to `/usr/alf`, add the MAIL line to it, and change the ownership and group of the directory and files.

If you want to set a specific shell—

Listing 1: The newuser Shell Script

```
# newuser--shell script for adding a new user to the system
# author:      tom barrett      unix/world, december, 1986
# modify:     tom ronayne      aptc, april, 1987
# install:    /etc
# owner:      root
# group:      root
# mode:       700
# note:       leave first line blank for c shell
#
SHL=/bin/sh                # default login shell (Bourne)
GID=100                    # default group id for user accounts
USER_PARENT=/usr           # parent directory for user accounts
MINUID=100                 # starting uid for user accounts
# check for valid use--login name is required
if [ $# -lt 1 -o $# -gt 4 ]; then
    echo "Usage:  $0 account[Name [ shellpath [ GID [ homeparent ] ] ]"
    exit 101
fi
# check to see if account already exists
USER=$1
nm='awk -F: ' $1 == \"$USER\" /etc/passwd'
if [ -n "$nm" ]; then
    echo User $USER already in password file
    exit 102
fi
# determine login shell and do simple validity check
if [ $# -gt 1 ]; then
    SHL=$2
    if [ ! -x $SHL ]; then
        echo "$SHL is not an executable file"
        exit 103
    fi
fi
# determine group and check validity:
if [ $# -gt 2 ]; then
    GID=$3
    grpck='awk -F: ' $3 == \"$GID\" /etc/group'
    if [ -z "$grpck" ]; then
        echo "Invalid group: $GID"
        exit 104
    fi
fi
# determine home directory
if [ $# -gt 3 ]; then
    USER_PARENT=$4
fi
# set home directory
HOMEDIR=${USER_PARENT}/${USER}
# now get the next available user id, where UID >= $MINUID
if [ -n "`awk -F: '{print $3}' /etc/passwd | fgrep $MINUID`" ]; then
    UID='sort -t: +2n /etc/passwd | awk -F: \
        'BEGIN{last=0}\
        ($3!=last+1)&&(last>=$MINUID){print last+1;exit}\
        {last=$3}\
        END {print last + 1}`'
else
    UID=$MINUID
fi
# update the password file
if mkdir /etc/ptmp; then
    echo "$USER::$UID:$GID::$HOMEDIR:$SHL" >> /etc/passwd
    rmdir /etc/ptmp
else
    echo "Password file busy, try again later."
    exit 105
fi
# if the home directory doesn't exist, make it now
if [ ! -d $HOMEDIR ]; then
    mkdir $HOMEDIR
fi
# install appropriate shell start-up files and change ownership
# of the directory and files
if [ $SHL = /usr/ucb/csh ]; then
    cp /etc/.login /etc/.cshrc $HOMEDIR
    echo "set mail=/usr/mail/$USER" >> $HOMEDIR/.cshrc
    chown $USER $HOMEDIR/.login $HOMEDIR/.cshrc
    chgrp $GID $HOMEDIR/.login $HOMEDIR/.cshrc
elif [ $SHL = /bin/sh ]; then
    cp /etc/.profile $HOMEDIR
    echo "MAIL=/usr/mail/$USER" >> $HOMEDIR/.profile
    echo "export MAIL" >> $HOMEDIR/.profile
    chown $USER $HOMEDIR/.profile
    chgrp $GID $HOMEDIR/.profile
fi
chown $USER $HOMEDIR
chgrp $GID $HOMEDIR
echo User $USER is set up--home directory is $HOMEDIR
exit 0
```


New Australian Distributors & Support Groups

Source: Cromemco News Releases, Sept. 14, 1987 & October 26, 1987

Cromemco, Inc. announced that MAI-Australia Information Systems has been designated as a supported maintenance provider for Cromemco products in Australia. The agreement was reached by Chuck DePew, Vice President of Sales for Cromemco and Fritz Welshinger, National CE Manager for MAI-Australia.

In announcing the agreement, Mr. DePew said "MAI has an outstanding reputation for customer support and we are very proud that they will be maintaining our systems in Australia. Cromemco has been remarkably successful in international markets, with international sales now accounting for over 50% of our business. We owe our success to having our systems well supported by local companies such as MAI."

MAI-Australia is based in Sydney and has offices in all major cities in Australia.

In addition, Cromemco announced that Confratel Pty. Ltd. has been

designated a distributor for Cromemco's products in Australia. This agreement was reached between Chuck DePew, Vice President of Sales for Cromemco and Michael Brudenell, Chairman and Managing Director for Confratel.

In announcing the agreement, Mr. DePew said "Confratel has impressive credentials in Australia for their technical expertise and management skill. We are confident they will be a strong partner."

Confratel, based in South Melbourne, specializes in software support, training and a range of professional services for business users of applied computer technology.

Structural Engineering Programs

IACU member and civil engineer Dennis Photopoulos, of Athens, Greece, has developed a number of Fortran programs for the solution of structural engineering problems. He is making these programs available to other IACU members for a nominal fee.

Included among these programs are CLAPER, to solve a continuous beam of up to 10 spans using the Claperson method; PLANE to calculate stress for plane frames whose member edges may be clamped or pinned; SPAME to calculate stress

for space frames whose member edges may be clamped or pinned; TRUSS to solve space trusses (special case of the plane trusses) of any geometry; FOOT, a set of three programs to solve the problems of central eccentric footings; and many, many others.

For further information contact:

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SOFT TOOLS *Continued*

`newuser` defaults to the Bourne shell—do it like this:

```
# newuser alf /bin/csh
```

If you want to use a different group number:

```
# newuser alf /bin/csh 101
```

If you want to use a different parent directory:

```
# newuser alf /bin/csh 101 /std3/usr
```

Note that `newuser` isn't "smart;" i.e., to use a different homeparent, you've got to enter all the preceding fields.

Then, you should move any "worth saving" files from the user account to some other directory, delete any "worthless" files, and make an archive. You'll probably want to leave the home directory in place at least to the end of an archive period (end of year, or some such) in case you have to restore the file system. Then you can blow away the old account.

I've tried to cover two manholes with one bird—you should take a hard look at your `/etc/passwd` (and `/etc/group`) files and, if things are a mess, fix 'em. UNIX administrator's will find that the `newuser` shell script is a simple, elegant way of adding users to their systems without the usual pain-in-the-butt creating, copying, editing, and changing busy work. Cromix system administrator's already have a simple, elegant way of adding users, but should also take a hard look at the `/etc/passwd` and `/etc/group` files to see if a little "fixing" wouldn't hurt.

If you don't want to type `newuser`, you can download it from the APTC Cromix system. Dial in at 2400, 1200, 300, or 110 baud at (313) 835-0809, log in as `guest`, and download the files. If you'd prefer, send us a disk (5-1/4" or 8") with \$5 to cover postage and handling, and we'll be happy to make copies for you.

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USER NOTES

Port Modes Under UNIX

Editor's Note: The following UNIX port mode programs were contributed by Leo Solorazano of Control Electronico S. A., Apartado 6062, San Jose, Costa Rica.

One of the differences I noted when I started using Unix was the way it sets port modes (like baud-rate, parity, hand-shake, etc). In Cromix you simply use the `mode` utility and the port settings remain unchanged, until modified by `mode` or another program. Unix, on the other hand, maintains port modes only while some program keeps that port open for reading. When no program accesses that port, modes simply switch to their default settings. This makes for some inconvenience. For example, the spooler system `lp`, when installed as recommended in the Introduction to Unix, needs to execute the `stty` command (Cromix's `mode` equivalent) every time a spool job is printed. Also, if you want to access a port directly, it is almost impossible for most programming languages to change modes after opening it.

I wrote two equivalent programs to get around this inconvenience. One of these programs, `openp`, is a shell script and the other, `oport`, is a 'C' language program. Both operate in the same way, but the latter is more efficient and executes faster.

To use them simply type, at the shell prompt, the program name followed by the port name and, optionally, the modes to pass to the `stty` command to fix the port settings. These programs need to execute only once. If you further need to change modes, use only the `stty` command.

For example:

```
oport tty5 9600 cread opost onclr ixon -ixany
```

will set a typical port to be used by a serial printer. For more information about modes, please read about the `stty` command in the Unix manuals or the on-line manuals.

One convenient way to use these programs is to include them in the initialization table `/etc/inittab`, for automatic execution when Unix goes to multiuser mode. For example the `inittab` entry: ...

```
t5::once:/etc/oport tty5 9600 cread opost onclr ixon -ixany
```

will open port `/dev/tty5` for use with most printers at 9600 baud. Note that you need to place a copy of the program in the `/etc` directory.

If you use one of these programs in `/etc/inittab` as documented, you can delete the line that uses the `stty` command in the model program for the `lp` spooler. The modes remain unchanged, except when they are modified by another program, or explicitly by the `stty` command.

I am sure that you can find a lot of applications for these programs, mainly to find out what mode settings you need for a given device, or to experiment with communications.

```
1
2
3 #      @(#)openp.sh      Open port with optional mode setting
4 #      Written by:      Leo Solorzano, Aug 12-1987
5 #
6 #      Control Electronico S.A.
7 #      P.O. Box 6062, San Jose 1000
8 #      Costa Rica, Central America
9
10 if [ $# -lt 1 ]
11 then
12     echo "Usage: $0 dev [stty_arg1 stty_arg2...]"
13     exit 1
14 fi
15 DEVICE=/dev/$1
16 if [ ! -r $DEVICE ]
17 then
18     echo "$0: Cannot open $DEVICE"
19     exit 2
20 fi
21 sleep 30 < $DEVICE &
22 if [ $# -gt 1 ]
23 then
24     shift
25     stty $*($DEVICE
26     if [ $? -ne 0 ]
27     then
28         echo "$0: Error executing \"stty $*($DEVICE\"
29         exit 3
30     fi
31 fi
32 #trap '' 1 2 3
33 while true
34 do
35     sleep 65535($DEVICE
36 done
```

```
1
2
3 /*****
4 *      oport: Open port with optional mode setting
5 *
6 *      Written by: Leo Solorzano, Aug 12-1987
7 *      Control Electronico S.A.
8 *      P.O.Box 6062, San Jose 1000
9 *      Costa Rica, Central America
10 *
11 *****/
12
13 #include <stdio.h>
14 #include <signal.h>
15
16 char dev[80] = {"/dev/"};
17 char shcmd[128] = {"/bin/stty"};
18
19 main(argc, argv)
20 char *argv[];
21 int argc;
22
23 {
24     int i;
25     FILE *fd;
26
27     if (argc < 2)
28     {
29         fprintf(stderr, "Usage: %s dev [stty_arg1 stty_arg2...]\n", argv[0]);
30         exit(1);
31     }
32     strcat(dev, argv[1]); /* Complete device path name */
33     if ((fd = fopen(dev, "r")) == NULL)
34     {
35         fprintf(stderr, "%s: Cannot open %s\n", argv[0], dev);
36         perror(argv[0]);
37         exit(2);
38     }
39     if (argc > 2) /* Mode setting required? */
40     {
41         for (i = 2; i < argc; i++) /* Append stty arguments */
42             strcat(shcmd, argv[i]);
43         strcat(shcmd, "<"); /* Redirect input for stty */
44         strcat(shcmd, dev);
45         if (system(shcmd)) /* exec stty with its arguments */
46         {
47             fprintf(stderr, "%s: Error executing \"%s\"%s\n", argv[0], shcmd);
48             exit(3);
49         }
50     }
51     signal(SIGINT, SIG_IGN); /* Ignore signals */
52     signal(SIGQUIT, SIG_IGN);
53     for(;;) /* Loop forever */
54     {
55         sleep(65535);
56     }
57 }
```

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Sbasic Version 3.66 Shell Command

Editor's Note: The following program was contributed by Randal W. Pick, Sikeston Power Station, P.O. Box 370, Sikeston, MO 63801.

I recently received my copy of *I/O NEWS* Volume VI, Number 1 and noticed in the "32K Classroom" column a Structured Basic program listing that includes a shell command. Since this is such a powerful and useful function I decided to sit down and write a machine code subroutine to provide this for my SBASIC ver. 3.66, which is lacking this feature. This turned out to be easier than I expected. Following is a program listing that will provide this function that your readers may find valuable. It is quite short and easy to use.

To use the subroutines simply call the initialization subroutine with a Gosub Shellinit statement and thereafter anytime you want to issue a Cromix command issue a Gosub Shell statement. You could do away with the Input statement and define the variable Shell2\$ to be any command line desired. If you issue shell as a command then a new interactive shell will be created that allows you to enter any number of Cromix commands from the keyboard and return to the SBASIC program with the exit (or ex) command. When using an interactive shell, however, DO NOT use the [CNTRL-C] key combination. If you do, you will return to SBASIC but the newly created shell will not be killed. This will result in the old and new shells fighting over keystrokes, creating a very confusing situation for both you and the computer. It is apparently OK, though, to use [CNTRL-C] to terminate a non-interactive shell (any command except shell). Maybe someone out there knows a way around the [CNTRL-C] problem. This would probably involve manipulation of system "signals."

Mr. Thomas in his "32K Classroom" column mentioned a patch to 32K Basic that would also provide a shell function. This was provided by Norman Miller and appeared in *I/O NEWS*

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Volume 2, Number 2. Even though my subroutine should give me what I want, I would be very interested in seeing this patch. Could you possibly send me a copy of it?

[With pleasure, and if anyone else would be interested in a copy of that article just let me know. Ed.]

```

11000 Rem
11010 Rem SHELL subroutines by Randal W. Pick, Aug. 11, 1987
11020 Rem Route 2, Box 1125, Sikeston, MO, 63801
11030 Rem
11050 Rem subroutine sets up machine code subroutine to 'shell'
11060 Rem Cromix commands from SBASIC
11070 Rem
11080 Rem Machine code executes the following instructions:
11090 Rem ld de,pointer ;point to list of argument pointers
11100 Rem jsys 48h ;call .fshell Cromix call
11110 Rem jsys 45h ;call .wait Cromix call
11120 Rem pop de ;for return to SBASIC
11130 Rem ret ;return to SBASIC
11140 Rem
11150 *Shellinit
11160 Integer Code(4),Arg(4)
11170 Dim Shell2$(127)
11180 Data %1100X,%0200X,%48CFX,%45CFX,%C9D1X
11190 For X=0 To 4 : Read Code(X) : Next X
11200 Shell0$="shell" : Shell1$="-c"
11210 Arg(3)=0 : Rem terminates pointer list
11220 Return
11230 Rem
11240 *Shell
11250 Input "Command to Execute? ",Shell2$
11260 Arg(0)=Adr(Shell0$) : Rem define pointers to arguments
11270 Arg(1)=Adr(Shell1$)
11280 Arg(2)=Adr(Shell2$) : Rem put pointer into machine code
11290 Code(1)=Adr(Arg(0)) : Rem put pointer into machine code
11300 Dummy=Usr(Adr(Code(0)),P1)
11310 Return

```

```

10 Rem "sheldemo.lst" by Randal W. Pick
20 Rem demonstrates use of the SHELL subroutines
30 Rem
40 Gosub Shellinit
50 Gosub Shell
60 Print "I'm back in SBASIC!! (use <ESC> to quit)"
70 Goto 50
11000 Rem
11010 Rem SHELL subroutines by Randal W. Pick, Aug. 11, 1987
11020 Rem Route 2, Box 1125, Sikeston, MO, 63801
11030 Rem
11050 Rem subroutine sets up machine code subroutine to 'shell'
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11130 Rem ret ;return to SBASIC
11140 Rem
11150 *Shellinit
11160 Integer Code(4),Arg(4)
11170 Dim Shell2$(127)
11180 Data %1100X,%0200X,%48CFX,%45CFX,%C9D1X
11190 For X=0 To 4 : Read Code(X) : Next X
11200 Shell0$="shell" : Shell1$="-c"
11210 Arg(3)=0 : Rem terminates pointer list
11220 Return
11230 Rem
11240 *Shell
11250 Input "Command to Execute? ",Shell2$
11260 Arg(0)=Adr(Shell0$) : Rem define pointers to arguments
11270 Arg(1)=Adr(Shell1$)
11280 Arg(2)=Adr(Shell2$) : Rem put pointer into machine code
11290 Code(1)=Adr(Arg(0)) : Rem put pointer into machine code
11300 Dummy=Usr(Adr(Code(0)),P1)
11310 Return

```

Editors

Editor's Note: The following notes and articles were extracted from the CUG Newsletter #17 from July 1987, which is now edited by Adrian Pickering (formerly edited by Dr. Peter Norman). For information about the Cromemco Users' Group UK (CUG UK) write or call:

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and Computer Science,
The University, Southampton SO2 1PY,
United Kingdom
(+44) (0)703 559122 Ext. 2898

Ed Patching

I read with interest the note in *I/O NEWS*, Volume V, Number

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6 on configuring terminals for the "hardened favourite" editor ED (or SCREEN). I (and colleagues) have been patching this editor for years for various terminals, notably from the Televideo family. My experiences are:

(a) Insert Line and Delete Line entries are not actually used unless the terminal responds to the ENQ emitted by ED as it starts up. This tells ED whether it is using a 3101 or a 3102, the latter having Insert Line and Delete Line capability. It's a pity not to use them since it significantly improves scrolling behaviour.

The solution I adopted was to find the ENQ in the code (look for the `lda` followed by a system call) and substitute for it a `?` (for a Televideo). Then patch the last byte in the sign-on message to emit and ESC. The result is an ESC ? causing the terminal to reply with the current cursor position which is sufficient to persuade ED to think it is driving a 3102.

(b) Many modern terminals (Televideo 925 onwards) have an intelligent wrap feature which causes the screen display and ED to lose synchronization. The test is to create a file with a line of characters which fits exactly the width of the display, followed by a NEWLINE (typically 80 characters with the 81st being the NEWLINE). Type this onto the display of the terminal with which you wish to use ED. If the cursor "skips" a line before coming back with the prompt, it is matched to ED. If the cursor line appears exactly beneath the line of characters then lines which are exactly the width of the screen in any edited file are going to cause synchronization problems (which will not go away by Verifying the display). There is no quick fix to this problem; just choose your terminals carefully!


Oh, No—Not Another Editor!

Yes, for various reasons I had to rewrite a "beginners" editors

that had sufficient features for the reasonably sophisticated but was as easy to get to know as ED. My special interest is in Man-Machine interfaces and this aspect was looked at carefully. It also had to be highly portable to enable it to be used by the wide variety of machines we support in the Department. This is available in C for Cromix-plus and is fully "term-cap'ed" and user configurable (without having to get the "knife and fork" out). I think it still stands up well to a few other "source" editors that are around such as CSE and MicroEMACS. Any interest out there (particularly amongst the educational users)? (It is currently being ported to the VAX, IBM PC's and a "vanilla" UNIX system).

Kermit for Cromix-Plus

Igor Uherkovitch of VSL in Berne (Switzerland) and I have been cooperating over the last few months to produce a final Kermit. Dina Desai did the final integration work, including my modifications and those from W. Bohm et al. from the University of Passau (FRG). The project is now complete and Cromemco now has the sources (v1. 28) for further development. My visit to Cromemco a few months ago confirmed that there were people "out there" who wanted it, so now they should really bash on Cromemco's door! I use my version (v1. 27) almost daily to IBM PCs, VAXs and other strange homebrew machines.

Requests for Kermit should be to me at CUG, enclosing a floppy disk and SAE. Requests for other versions of Kermit for foreign machines should be directed at the Lancaster University Kermit distribution centre. For IBM PCs the latest versions of Kermit can be obtained through a number of Public Domain outlets such as Compulink at Guildford. I use v2.28L1 Kermit on my PC which runs about twice as fast as v2.29! 

dBase To Informix

Continued from front cover

in a single user environment, is now virtually impossible to have running. First, using the CDOS simulator under Cromix 30.4, DBASE II runs perhaps slower than on an old CP/M machine. Add two or more users running DBASE II simultaneously and the system creeps along so slowly that the office environment becomes mutinous (if not murderous).

Clearly, it was a difficult decision to move away from a software package that we could tailor to many needs and change so easily. However, once that decision was made, we began to evaluate alternative database software for the 68000 CPU to run under Cromix Plus. I describe here our experience in evaluating Informix, a software package offered by Cromemco. I should indicate at the outset that we have not yet reached a decision on any new database software for purchase. Most alternatives are expensive and since we like to "know" our software, not just "use" it, we'll live with our ultimate selection for many years. Having stated that, let me preview our bottom line on Informix for you: VERY IMPRESSIVE.

Since our database "background" is DBASE II, I'll use this frame of reference often for comparison.

First Question: "Can we move our DBASE II data into Informix format electronically, or will manual re-entry be required?"

Initial Answer: No utility is supplied for this with the package we tried. However, certain utilities for loading and unloading ASCII files are provided with both packages—thus it should be possible.

Next Question: "How similar are the database structure requirements?"

Answer: Very similar. Informix has many more variable types available.

Table 1 shows a comparison of a simple database structure used to log telephone calls. One uses the CREATE command under DBASE II to specify the structure. Using Informix, one enters a "schema" using a screen editor and then calls DBBUILD to compile the schema.

Entry of data is similar for the two packages. Unformatted screen entry in DBASE II follows the APPEND command. Informix provides a utility ENTER2 to ADD, UPDATE, DELETE, and FIND records. Formatted screens can be prepared by using the SAY, GET, ACCEPT commands in DBASE II assembled into .CMD and/or .FMT file(s). Informix provides FORMBUILD, a utility that compiles instructions from a screen file into a formatted entry file.

DBASE II STRUCTURE

FLD	NAME	TYPE	WIDTH
001	LASTNAME	C	025
002	FSTNAME	C	015
003	PHONE	C	012
004	DATE:CALL	C	008
005	TIME:CALL	C	005
006	TYPE:POIS	C	001
007	POISON	C	025
008	SYMP1	C	002
009	SYMP2	C	002
010	SYMP3	C	002
011	ACTION	C	001

TABLE 1

INFORMIX FILE SCHEMA

database poisonctr	
file phonecalls	
field lastname	type character length 25
field fstname	type character length 15
field phone	type character length 12
field date__call	type character length 8
field time__call	type character length 5
field type__pois	type character length 1
field poison	type character length 25
field sympt1	type character length 2
field symp2	type character length 2
field symp3	type character length 2
field action	type character length 1

Use of FORMBUILD has some similarities to the ZIP utility provided with some versions of DBASE II. FORMBUILD allows for some sophisticated input such as right or left justification, upper or lower case conversion, specification of acceptable entry values or ranges of values, default values, as well as numerous mathematical and other functions on fields during entry.

Using FORMBUILD, one notices a distinct increase in speed of entry as only the data areas of the screen are cleared or updated for ADD's, UPDATE's, or QUERY's. The entire screen is not repainted with each record.

Getting back to our desired transition from DBASE II to (potentially) Informix there remains the issue of converting DBASE II data files into Informix data files. No specific utility is supplied with Informix. However, since both packages allow for data files to be copied into an ASCII format, the conversion is possible. Figure 1 gives a

listing of some BASIC code to convert an ASCII system data file (SDF) created by DBASE II into an ASCII file that can be loaded with an Informix utility called DBSTATUS. If the following data are entered into a record for the database structure given in Table 1: John Doe, 999-737-1100, 01/01/87, 13:25, 1, STRYCHNINE, 5, 10, 11, 4 where codes are used for the type of poisoning (suicide attempt, accidental, industrial, etc.), symptoms (nausea, pain, dizziness, etc.) and action taken (referred to hospital, remain at home, etc.), the DBASE II SDF created by issuing the command "COPY TO filename SDF" would have each record on a line in an ASCII text file (extension automatically added to produce filename.txt) that would be:

DOE JOHN 999-737-110001/01/8713:251STRYCHNINE ...

In order for Informix to load ASCII data, the record should be:

DOE |JOHN |999-737-1100|01/01/87|13:25|1|STRYCHNINE ...

Figure 1: Basic Program to Convert from dBASE to Informix "loadable" Format

```

10 dim wid%(32)
20 dl$ = ":"
30 clr$ = chr$(27)+"E":print clr$:tab(20); &
  "DBASE II SDF ---> Informix file conversion":print:print
40 input "Enter name of Dbase II SDF file (Up to 8 characters) ":sdf$
50 dbf$ = sdf$ + ".txt":opf$ = sdf$ + ".inf"
60 input "Enter number of records to convert: ":rtc%
70 open dbf$ for input as file #1
80 open opf$ for output as file #2
90 print:print:print tab(30);"[Enter field width of 999 to end]":print
100 for i% = 1 to 32
110 print "Enter width of field #":i%:input " >":wid%(i%)
120 if wid%(i%) = 999 then numf = i%-1:goto 140
130 next i%
140 for a% = 1 to rtc%
150 input line #1,s$
160 print clr$:"Record #":a%
170 ps$ = left(s$,wid%(1))+dl$
180 spos = wid%(1) + 1
190 for i% = 2 to numf
200 ele$ = mid(s$,spos,wid%(i%)) + dl$
210 spos = spos + wid%(i%)
220 ps$ = ps$ + ele$
230 next i%
240 print #2,ps$:ps$ = "":spos = 0
250 next a%
260 close #1:close #2
270 print "Number of records converted.....":a%-1
275 print "Now residing in file ";opf$;"", delimited by -->";dl$;"<--"
280 end

```


The vertical bars are default delimiters for Informix. If your data files contain vertical bars as an entry character in any field, you must specify another delimiter to use when issuing the DBSTATUS "load ascii" command and also alter line 20 in the BASIC code to the new delimiter.

Note that the DBASE II command to establish a system data file with delimiters does not produce an acceptable ASCII file for loading under Informix.

To briefly describe the BASIC code, line 10 dimensions an array of 32 integers that represent the widths of each of the 32 possible fields in a DBASE II record. Line 20 defines the delimiter that the program will insert between fields in the Informix compatible output file. Line 30 clears the screen on a CROMEMCO terminal. Line 40 accepts the filename (without extension) of the DBASE II SDF file that was previously created. Line 50 assigns extensions to the filenames that are to be used. OPF\$ is the output file that will contain ASCII data now in a format that Informix will accept. Line 60 asks for the number of records to accept for conversion. This could be handled by ON ERROR or END OF FILE processing but I prefer to give a specific number. Line 100 begins a loop to interrogate the user as to the exact field width of each field in a DBASE II record. It is best to have a copy of the DBASE II file structure in front of you when entering these integers. The loop stops after the 32nd field or when the user enters a 999 width for a field. Line 140 begins a loop that converts all the records into Informix compatible input. It begins by displaying the record it is working on in the upper left of the screen and to "fix" the first field in the record. At Line 190 is a nested loop to move through the DBASE II SDF, one field at a time and insert the delimiter after each field. At the conclusion of the nested loop, the re-formatted record is written to the output file (Line 240) and the program continues in the outer loop for the next record to convert.

The output file is compatible with the "load ascii" command from the Informix utility DBSTATUS. A word of caution here relative to BASIC interpreters that may be used to run this code: the end of line terminators inserted by the interpreter may make the record not precisely what DBSTATUS is looking for. If this happens, you may wish to modify the BASIC code to get around your own interpreter, or I have found that if you call-up the new ASCII file with a Cromix or Unix utility like CE (Cromix Screen editor), then just exit/update, CE will strip off the offending terminator and leave just a line-feed. The file can then be input using

DBSTATUS. In trial runs, we have converted thousands of DBASE II records to Informix compatible format. Another note on the BASIC interpreter you may use: some BASICS will only allow a text string of 256 bytes. If the record you are converting is longer than this, you may have to split your database into more than one SDF file by using the "COPY FIELD field 1, field 2, field 3, etc. TO filename SDF" command so that each output line of ASCII text does not exceed 256 bytes.

Once converted, the DBSTATUS program in the Informix package is used to load the ASCII file into the .dbd format of an Informix database file. Under Cromix, Informix creates an .idx file and a .lok file as well that defines indexing and access permission to fields within the database.

Benchmarks appear to be very subject to conditions defined by the tester, but we found one sort/count procedure on our DBASE II data that took 65 minutes to run to be completed in just over 3 minutes with Informix.

Queries of the database are possible using the ENTER2 Informix utility where a single field can be designated for searching through records. An extraordinarily nice feature of the PERFORM utility of Informix is the ability to fill in one or all fields of the database with test values, test ranges, or ambiguous values and have the database searched. Records that fulfill the specified criteria are counted and brought forward into an "active" status that can then be reviewed sequentially on the screen, sent to a separate ASCII text file (for further text manipulation or spooling), updated, or deleted. As noted earlier, the review of these records on the screen, once the search has been completed, is very fast. Only the variable data portions of the screen are altered as one pages through the records (using the single key Next or Previous commands), not the explanatory data such as descriptive phrases, field names, etc. As well, since the records have been brought "out" of the database into a "currently active" record list, access to the disk drive for each record is evidently not required.

Our ability to write reports using the Informix programs ACEPREP and ACEGO required more study than was required for the internal report generation in DBASE II. In fact, we ultimately needed some assistance from an experienced Informix user to get the proper "orientation" for use of this part of the Informix manual. In our case this was kindly supplied by Bill Jaenicke of I/O NEWS in the form of example report files that he uses. An example of a simple report on the database we described above would be one where an

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alphabetical listing of each poison is printed with a subsequent alphabetical listing of each patient with that poison, their phone number, and the time of the call. The file shown in Figure 2 is created with a screen editor and then compiled using ACEPREP for an executable .arc file using ACEGO. An example of the report output is shown in Figure 3.

The report writer has many features that we have not attempted to use. Perhaps if there is enough interest from other users, a tutorial column could be established by Jordan Siedband or others with real expertise in running Informix. Quite clearly, Informix could meet our needs for some time particularly with regard to multiple simultaneous access to files.

Acknowledgement:

The author would like to thank Bruno Dugas and Keith Corkum, of D.E. Systems, Ottawa, for the enthusiasm and competent assistance they provided in enabling us to evaluate the Informix relational database management system.

About the Author:

Robert Peterson, M.D., PhD., has been working with Cromemco systems

Continued on page 22

68Kalc Review

Continued from front cover

it just means that I want to see if I can give you a feel for the product).

The first thing I noticed when I opened the shipping box was a classy looking 8½ by 11 slip case (well, the first thing was really the license, but I'm doing this like a "real user,"—visualize a kid at Christmas—so we'll ignore the license for now). My first thought was, "Gee, a hefty, 8½ by 11 book instead one of those dinky 5 by 7 things."

A three-ring "lay-flat" binder slides out of the grey slip cover, opens to show a 5¼" disk, and a Users (sic) Guide. Inside that is a letter from Warecraft thanking me for choosing their software, explaining that I need to pay attention to some things having to do with the "config" utility, and advising me that Warecraft is working on enhancements and "bug fixes" to take care of some minor problems.

Open the Guide, glance at the Copyright notice, and flip to the table of contents—nice, there's:

- Quick Reference Summary;
- Configuration and Installation;
- How to Use 68Kalc;
- Help;
- Commands;
- Copying, Erasing, and Formatting Data;
- Manipulating Files;
- Exiting from the Program.

The "Quick Reference Summary" is divided up by "whadayawannado? here's the keystrokes" (see Figure 1).

I particularly like that it's in the FRONT of the manual instead of buried someplace in the back.

There's a map of the Command Menu that shows—graphically—how you

move from place to place within 68Kalc. Nifty.

The "Configuration and Installation" section tells me that 68Kalc requires these minimums:

Cromemco DPU or later 68000-family processor;

Cromix-Plus Operating System Version 31.05 or higher;

256K of available memory;

An ASCII terminal and its description in /etc/termcaps;

A floppy disk drive.

I'm going to install 68Kalc in a Cromix/UNIX System V machine; i.e., XPU, XMM, couple meg of RAM, multiple hard disk drives, so I should be ok.

I'm going to install it to use my current terminal description, which is a Digital Equipment Corporation (DEC) VT-100 emulation.

The installation instructions tell me to mount the distribution disk, change to it, list it, and then "kinstall" the software. I'll note that the disk is write-protected—like all distribution copies of any software, it should remain write-protected—and the instructions omit telling you that you should:

```
mount -r /dev/sfda /whatever
```

instead of:

```
mount /dev/sfda /whatever
```

What Files Are On the Disk and What To Do With Them

You get four .bin versions of 68Kalc—which are "config'd" for 256K, 512K, 1M and 2M; e.g., 68Kalc1m.bin, the kinstall.cmd file (which installs the software), a demo.kalc sample spreadsheet, and a sample.termcaps.

After the files are copied from the distribution media to your /bin and /etc directory, you rename one .bin file 68Kalc.bin and use it from then on (I suppose you just delete the unwanted copies). Each file has a fixed number of

cells, and a fixed shape, but we don't know exactly how many or what.

Then, you need to fiddle with /etc/termcaps. One file on the distribution disk is sample.termcaps, which is copied to your /etc directory, and part of it is reproduced in the manual.

You need to modify your existing termcaps entries and add the function key definitions (k0 through k9) if you have function keys, kb for the back space key, kbx for an alternate back space key, ka for a "key_argument" feature, kat for an "address-of" feature, and xmc which is the so-called "magic cookie glitch" for how many character spaces are occupied by special video functions by your peculiar terminal.

You can either define or not define the function keys (I chose not to): commands and functions work fine with either a function key or with a typed character sequence. The other keys, though, are necessary for moving around and editing functions.

I'm not going into a detailed discussion of termcap entries and their what's and why's—suffice that the instructions tell you what to do, where, and to some extent why, and you're expected to have some basic knowledge of what you're doing from having read your Cromix-Plus documentation (you DID read the manual, didn't you?).

Using 68Kalc

The manual tells me that 68Kalc uses a Lotus 1-2-3-like command menu, which doesn't mean a whole lot to me; I've never used Lotus 1-2-3 (or wanted to), so this'll be a learning experience.

I'm not a spreadsheet user—I've always either written a quick program or used a data base manager to get answers I need when I need them. The types of applications I need and use don't lend themselves to spreadsheet manipulation, so I just don't use them often enough to qualify as a "rated expert." I have, though, owned and used Sorcim's SuperCalc on and off for some years (the Z80 version), and I'm familiar with what SuperCalc will and won't do and how it does and doesn't do things, so—to some extent—I have to compare and contrast 68Kalc with SuperCalc.

Spreadsheets are convenient, useful tools for people who aren't programmers (and don't want to become programmers) to use to get the answers they need quickly and easily.

68Kalc is laid out in alphabetic columns and numbered rows—which are called "cells." (If there is anybody left on the planet that's never seen an electronic spreadsheet, they look like an accounting pad.) Figure 2 shows the 68Kalc screen display for the demo.kalc spreadsheet provided on the distribution diskette.

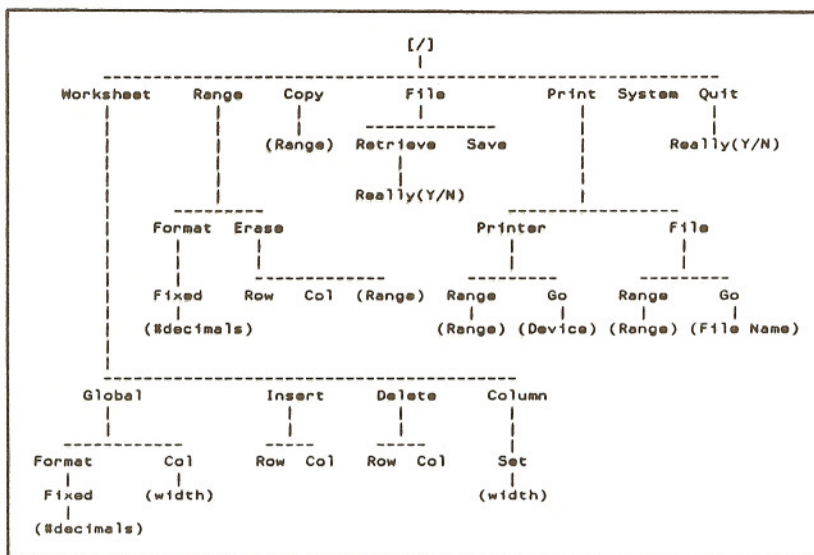


Figure 1: The 68Kalc Menu Hierarchy

A1	Worksheet	Range	Copy	File	Print	System	Quit	COMMAND
	Global, Insert, Delete,	Column-Width,	Erase					
	A	B	C	D	E	F	G	
1								
2								
3		JAN	FEB	MAR	APR	MAY	JUN	
4		---	---	---	---	---	---	
5	SALES	0	0	7500	17520	22545	19755	
6	LESS:							
7	RETURNS/ALLOW	0	0	0	75	175	225	
8	CASH DISCOUNT	0	0	38	88	113	99	
9		---	---	---	---	---	---	
10	NET SALES	0	0	7462	17357	22257	19431	
11								
12	COST OF SALES:							
13	MANUFACTURING	0	0	1275	2978	3833	3358	
14	ROYALTIES	0	0	140	328	422	369	
15	COMMISSIONS	0	0	675	1577	2029	1778	
16		---	---	---	---	---	---	
17	COST OF SALES:	0	0	2090	4883	6284	5505	
18								
19	GROSS PROFIT	0	0	5372	12474	15973	13926	
20	GROSS PROFIT %	0	0	72	72	72	72	

Figure 2: The 68Kalc Demo Screen Display

The cells are where stuff goes; e.g., alphanumeric labels, formulas, values, etc. The first column-row is A1, and the last is ZZn, where the n is the last numbered row in your spreadsheet which varies by which configured size of 68Kalc you're using; i.e., the smaller versions are smaller, the larger versions are larger—it depends on available RAM.

By default, 68Kalc starts without highlighted display—if you want to have the row, column, and current cell display in reverse, you start 68Kalc with:

% 68Kalc -b

Also by default, the cells are initially nine characters wide, which you can change to from two to 73 characters (two to 125 characters on a 132-column terminal). This means you can enter 9 characters in a label (and stay in the column—you can "slop-over" to an adjacent column), and that an entered value or calculated result must fit in 9 character positions. Being able to vary the cell width means that you're able to define both how big your displayed numbers are, and an output format.

Entering something into a cell is done by moving the "cell cursor" to the cell you're interested in, entering an appropriate data entry command, and entering the data you want in the cell. If you use the -b option (which displays reverse video), the current cell is displayed in reverse, and the cell "address" is displayed in the upper left corner of the screen.

68Kalc is command oriented—much like the Screen or Ce editors. You command 68Kalc to enter a given mode, do

what you want to do, and then exit the mode (like "insert," type, "escape" in the editor). The modes are:

Command—for entering commands;
Enter—for entering formulas, labels, and numbers;
Value—for command arguments;
Edit, Help, Quit, Goto, Print, Read, and Save.

Test Drive

So, let's start it up and see what we think.

Warecraft supplies a sample spreadsheet—demo.kalc—that you can play with to see how things work:

% 68kalc -b demo.kalc
starts things going.

The first thing I notice is that the screen display seems slow; the impression is that the terminal slowed down from 9600 baud to, oh, 1200 baud (see below).

Then, test the /etc/termcaps entry by trying the cursor motion keys—can we move up, down, left, right, and go home properly? Yep, works.

Ok, let's enter some information and a couple formulas and see what happens. This is done by moving to a cell (with the "goto" command or the cursor control keys), and typing something in.

The "something" is a Label, a Value, or a Formula. Labels are just that—alphanumerics that label a particular cell; e.g., "Fixed Costs," "Marketing," etc. Values are numbers; e.g., 100, 3.2, etc. Formulas are the equations or logical operations you want done on the Values entered in other cells.

Labels can be entered left-, right-, and center-justified (nifty feature). You enter a single quote (') for left justification, a double quote (") for right justification, or a caret (^) for centering.

If you're entering values or formulas, you precede your entry with an equals (=).

I merrily typed in some test labels and values and started entering a few formulas. 68Kalc aborted to the operating system (oops).

Time to call Warecraft and find out what I'm doing wrong.

Talking with Warecraft, I learned that I should have included the "insert mode" and "end insert mode" in /etc/termcaps, and that there is an apparent bug in 68Kalc in that it doesn't "do nothing" if you don't enter a leading "=" in a formula.

The Speed Problem

I keep my /etc/termcaps entries at the minimum required to work with the editors (particularly CE), and didn't have the "insert mode" entry "turned on." 68Kalc uses /etc/termcaps, and does its terminal input and output through a Warecraft-ported version of a "curses" terminal handling library. It seems that screen speed is much better with curses if you use the insert mode, and, when I changed my /etc/termcaps, screen speed did improve, drastically, and I've no complaint with it.

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The Abend Problem

The abort problem was simple: I made a mistake—you're supposed to enter a **Label, Value, or Formula with a leading character** to tell 68Kalc what you're doing; i.e., a quote, double quote, or caret for a Label, or a equals sign for a Value or Formula. When I didn't do this, 68Kalc tried to write outside of the system, the XMM caught it and aborted.

My fault. Like I said, I'm accustomed to SuperCalc, which lets you enter whatever you want to in a cell by just typing it in, and SuperCalc parses your entry into a valid label, formula, or value by what you entered and displays an error message if it doesn't understand what you did.

The "abend," however, is a bug—software is supposed to "do nothing" when you don't enter things properly—and Warecraft is attending to it. (Abend, for those fortunate enough to have never been exposed to IBM equipment, means "abnormal end.")

Reviewing Software

If you build programs, particularly programs that will be used by others, you've probably run into the same things I have: you wrote it, you know how to use it, and you expect (unwisely, as it always turns out) that others will, too.

You find out (quickly) that others don't always know how to use a program, and will try things that you never planned for. What I did—not entering a formula properly—is both typical of the type of innocent bug that can get built into software and forgivable in review versions.

The whole idea of reviewing a product is that you get somebody who's not been in on the design or manufacture to try it so you can find out where you've been blind to errors and omissions. I found a blind alley, and Warecraft is attending to it ('way to go, Warecraft).

Operators

68Kalc supports a full range of arithmetic and logical operators: plus

(+), minus (-), multiply (*), divide (/), remainder (%), exponentiation (^), complement (~), equals (=), less than (<), less than or equal (<=), greater than (>), greater than or equal to (>=), and (&), or (|), and condition (?).

There are also compound operators, range add (+/) and range multiply (*/), which work on all values in a given range of cells; e.g.,

+ /D3..E4

adds the contents of D3, D4, E3, and E4 and puts the result in the current cell.

The conditional operators work like you'd expect logical operators to work in the C programming language; e.g.,

(A1 >= 5) ? A2 + A3 : +/A1..A3

means that if A1 is less than or equal to 5, add A2 and A3; otherwise, add A1, A2, and A3.

Calculating and Re-drawing the Spreadsheet

An annoying habit of SuperCalc is the automatic re-calculation of the entire spreadsheet every time you enter a value (which can take a long time with big spreadsheets). 68Kalc calculates from cell A1 through ZZn, down and to the right, and, if you enter a new value someplace, it doesn't re-calculate the whole spreadsheet when you hit the return key.

That's good, re-calculation is time consuming (SuperCalc handles this by letting you turn off the automatic re-calculation function), and it's annoying to have to wait so you can enter the next cell's data. Obviously, a 68000-based spreadsheet re-calculates MUCH faster than a Z80-based spreadsheet, but it still takes time. It's also bad in that you've got to remember to "force" re-calculation every so often, but I think that hitting the "calc" key is the lesser of two evils.

Editing the Contents of a Cell

68Kalc provides an Edit Mode so you can see the contents of a cell. This lets you both verify a formula, and enter a formula if you made an error on edit. You can exchange characters (by typing over them), delete characters, and insert characters in a formula in the edit mode. This is handy if you're not infallible.

Help

You can get online Help by pressing the Help key—if you defined the function keys in your /etc/termcaps—or the (?) key. 68Kalc clears the bottom half of the screen and displays the help text, which you can scroll through with your cursor keys.

A feature is that Help works like the ce editor: if you enter:

10 [down arrow]

you'll scroll 10 lines down.

You can display the Help, get the information you need, and then return to the spreadsheet, or, and this is a feature, you can jump between Help and the spreadsheet, leaving the Help on the screen until you're finished.

68Kalc Commands

You issue commands that affect parts or all a spreadsheet by entering a leading slash (/). 68Kalc then lets you:

- Insert, delete, and adjust rows, columns, and ranges in the spreadsheet; (Adjusting means change the width of a column—or all columns—in the spreadsheet.)
- Copy, erase, and format ranges of data; (Copy a row and its contents and adjust the row (or rows), so things calculate properly; erase a cell or range of cells; erase a row or column; erase the entire spreadsheet; format—set the mathematical precision of—a column or the entire spreadsheet.)
- Manipulate files; (Retrieve a saved spreadsheet; save this spreadsheet; print all or part of a spreadsheet to a printer; print all or part of a spreadsheet to a file.)
- exit from the spreadsheet. (Quit completely; temporary jump to the operating system.)

Overall

It's gratifying to know that software developers are interested enough in Cromemco's excellent Cromix-Plus operating system to develop software for it, and 68Kalc has all the earmarks of being a useful tool for people to use.

Right now, I feel that it's missing a couple features. Mind, none of these are critical—but I believe that they're desirable.

Things I'd like to see: A "replicate with choice" command (where you can copy a set of formulas into another cell or range of cells and selectively NOT adjust part or all a formula); "Context help" (where you "?" when you're entering a formula or command to get specific help); "Blank instead of zero" (where a cell remains blank if a logical or mathematical operation result is zero—this is useful in, say, a checkbook); "Table Look up" (where you create a table, say, tax rates, and look up a value based on a range of values); "Read A File Into A Skeleton" (where you have a spreadsheet—with all the rules—and read in a file of data for calculation and display).

Again—none of these are critical to using a spreadsheet, but they (and other features) make a spreadsheet more usable.

So, What'd I Think?

It works. It's easy to get to know. I could learn to love it.



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- ☐ 02 C-10 CP/M
- ☐ 03 PC-DOS
- ☐ 04 S-100 CDOS
- ☐ 05 S-100 CP/M
- ☐ 06 Z80 CROMIX
- ☐ 07 68000 CROMIX-D
- ☐ 08 CROMIX-PLUS
- ☐ 09 UNIX System V
- ☐ 10 Others: _____

2 Computer Models

- ☐ 01 C-10 PC
- ☐ 02 IBM-PC
- ☐ 03 PC-clone
- ☐ 04 CS-1
- ☐ 05 CS-22D
- ☐ 06 CS-22H
- ☐ 07 CS-3
- ☐ 08 CS-100
- ☐ 09 CS-200
- ☐ 10 CS-300
- ☐ 11 CS-400
- ☐ 12 CS-420
- ☐ 13 Others: _____

3 I/O and Communications

- ☐ 01 Biart
- ☐ 02 CNI
- ☐ 03 CSP
- ☐ 04 Dazzler Graphics
- ☐ 05 ENET
- ☐ 06 IOP/Quadrat
- ☐ 07 IOP-X
- ☐ 08 Octart
- ☐ 09 PRI
- ☐ 10 SDI Graphics
- ☐ 11 S-Series Graphics
- ☐ 12 Tuart
- ☐ 13 Others: _____

4 Printers

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- ☐ 02 Centronics
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- ☐ 05 Dataproducts
- ☐ 06 Epson
- ☐ 07 Facit
- ☐ 08 IBM
- ☐ 09 NEC
- ☐ 10 Okidata
- ☐ 11 Qume
- ☐ 12 Texas Instruments
- ☐ 13 Others: _____

5 Storage Controllers

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- ☐ 03 64FDC
- ☐ 04 64FDX
- ☐ 05 WDI
- ☐ 06 WDI-II
- ☐ 07 STDC
- ☐ 08 STDC-X
- ☐ 09 SMDI
- ☐ 10 SMDX
- ☐ 11 Others: _____

6 Terminals

- ☐ 01 Ampex
- ☐ 02 Beehive
- ☐ 03 Cromemco 3102
- ☐ 04 Cromemco C-05
- ☐ 05 Cromemco C-15
- ☐ 06 DEC
- ☐ 07 Hazeltine
- ☐ 08 RGB
- ☐ 09 Televideo
- ☐ 10 Wyse
- ☐ 11 Others: _____

7 Memory

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- ☐ 02 64KZ
- ☐ 03 256KZ
- ☐ 04 512MSU
- ☐ 05 MCU
- ☐ 06 1024KZ
- ☐ 07 2048KZ
- ☐ 08 2048MSU
- ☐ 09 MCUX
- ☐ 10 32KBS
- ☐ 11 Others: _____

8 Processors

- ☐ 01 SCC
- ☐ 02 ZPU
- ☐ 03 DPU
- ☐ 04 Maximizer
- ☐ 05 XPU
- ☐ 06 XMM
- ☐ 07 XXU
- ☐ 08 XMU
- ☐ 09 Others: _____

9 Instrumentation & Control

- ☐ 01 4PIO
- ☐ 02 8PIO
- ☐ 03 ADC12
- ☐ 04 D+7A
- ☐ 05 DAC12
- ☐ 06 GPIB
- ☐ 07 Others: _____

10 Mass Storage

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- ☐ 02 Floppy
- ☐ 03 Hard Disk
- ☐ 04 Hard Disk
- ☐ 05 CTD Cartridge Tape
- ☐ 06 9-Track Tape
- ☐ 07 Others: _____

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|--|--|---|--|
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12 Software (Indicate software you currently use under U and software you would like to know more about under W)

- | | | | | | | | |
|---|---|--|---|----------|----------|----------|----------|
| U | W | U | W | U | W | U | W |
| <input type="checkbox"/> 01 Accounting | <input type="checkbox"/> 14 Engineering | <input type="checkbox"/> 27 Library Science | <input type="checkbox"/> 40 Resource Management | | | | |
| <input type="checkbox"/> 02 Agricultural | <input type="checkbox"/> 15 Facilities Management | <input type="checkbox"/> 28 Management | <input type="checkbox"/> 41 Sales/Marketing | | | | |
| <input type="checkbox"/> 03 App. Development | <input type="checkbox"/> 16 Financial Management | <input type="checkbox"/> 29 Manufacturing | <input type="checkbox"/> 42 Service Industries | | | | |
| <input type="checkbox"/> 04 Arts | <input type="checkbox"/> 17 General Business | <input type="checkbox"/> 30 Media | <input type="checkbox"/> 43 Spreadsheets | | | | |
| <input type="checkbox"/> 05 CAD/CAM | <input type="checkbox"/> 18 Government | <input type="checkbox"/> 31 Networking | <input type="checkbox"/> 44 Statistics | | | | |
| <input type="checkbox"/> 06 Communications | <input type="checkbox"/> 19 Graphics | <input type="checkbox"/> 32 Office Automation | <input type="checkbox"/> 45 Tax Preparation | | | | |
| <input type="checkbox"/> 07 Construction | <input type="checkbox"/> 20 Health Care | <input type="checkbox"/> 33 Personal Computing | <input type="checkbox"/> 46 Text Processing | | | | |
| <input type="checkbox"/> 08 Data Conversion | <input type="checkbox"/> 21 Info Management | <input type="checkbox"/> 34 Process Control | <input type="checkbox"/> 47 Trade | | | | |
| <input type="checkbox"/> 09 Database Management | <input type="checkbox"/> 22 Insurance | <input type="checkbox"/> 35 Project Management | <input type="checkbox"/> 48 Transportation | | | | |
| <input type="checkbox"/> 10 Defense Electronics | <input type="checkbox"/> 23 Inventory Control | <input type="checkbox"/> 36 Publishing | <input type="checkbox"/> 49 Utilities (Gas, Power, etc) | | | | |
| <input type="checkbox"/> 11 Desktop Publishing | <input type="checkbox"/> 24 Lab Automation | <input type="checkbox"/> 37 Real Estate | <input type="checkbox"/> 50 Utilities (software) | | | | |
| <input type="checkbox"/> 12 Distribution | <input type="checkbox"/> 25 Language Processors | <input type="checkbox"/> 38 Recreational | <input type="checkbox"/> 51 Other | | | | |
| <input type="checkbox"/> 13 Educational | <input type="checkbox"/> 26 Law | <input type="checkbox"/> 39 Research | | | | | |

13 IACU Feedback

- 01 How did you first learn of Cromemco? _____
- 02 How did you first learn of the IACU? _____
- 03 For what do you use your system(s)? _____
- 04 Besides yourself, how many people read your copy of I/O NEWS? _____
- 05 Indicate departments regularly read in I/O NEWS:
- | | |
|--|--|
| <input type="checkbox"/> INPUT | <input type="checkbox"/> INSIDE CROMIX |
| <input type="checkbox"/> OUTPUT | <input type="checkbox"/> TEC TIPS |
| <input type="checkbox"/> BITS & BYTES | <input type="checkbox"/> SOFT TIPS |
| <input type="checkbox"/> NEW PRODUCTS | <input type="checkbox"/> SOFT TOOLS |
| <input type="checkbox"/> C-10 ENCOUNTERS | <input type="checkbox"/> HACKER'S HOME |
| <input type="checkbox"/> 32K CLASSROOM | <input type="checkbox"/> USER'S NOTES |
- 06 Which features or articles have you found to be most interesting/beneficial? _____
- 07 As above, but least interesting or beneficial? _____
- 08 What types of articles would you be most interested in reading? _____
- 09 As above, but least interested? _____

- 10 In general, do you find I/O NEWS editorial:
☐ Very useful ☐ Interesting only ☐ Not useful
- 11 What additional departments would you suggest (such as SOFT TOOLS)? _____
- 12 Would you be interested in contributing an article to I/O NEWS? ☐ Detail subject matter: _____
- 13 Have you responded to I/O NEWS advertising? _____
- 14 Which ones? _____
- 15 What were your general impressions? _____
- 16 Are there any specific side benefits you would like to see the IACU offer? _____
- 17 What new products would you like to see Cromemco introduce?
 Hardware: _____
 Software: _____
- 18 Do you have any suggestions on how the IACU and/or I/O NEWS could be improved? ☐ List: _____

Continued

19 On a scale from 1 (low) to 5 (high), how would you rate Cromemco in the following categories?

	1	2	3	4	5
Overall Satisfaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dealer Support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cromemco Service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Affordability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Performance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

20 Have you done any special peripheral interfacing (plotters, sensors, process control, etc)? Describe: _____

21 How long have you been using Cromemco equipment? _____

22 Have you ever upgraded your system? ☐ Describe: _____

23 Are you considering an upgrade to your present system? ☐ Describe: _____

24 Further comments: _____

Mail this survey to:

The IACU - I/O NEWS
24843 Del Prado, Suite 473
Dana Point, CA 92629-2852
USA

Name: _____

Company: _____

Address: _____

IACU #: _____

Phone: _____

Attach Business Card

System Improvement Request Submission Form

Page 1 of _____

Submittor: _____

Firm: _____

Address: _____

Phone: _____

How to write a SIR:

Describe the capability you would like to see available on Cromemco systems. Be as specific as possible. Please don't assume that everyone knows how it's done on the XYZ system. Justify why the capability would be useful and give an example of its use. If you wish, suggest a possible implementation of your request.

Abstract: _____

Description and examples (use additional pages if required)

Advanced Programming Techniques Corporation

Advanced Programming Techniques Corporation's *Inventory Management System* (which we refer to as APTC's IMS) was designed to give you control of your business. You get control of your business by having information. Whether you operate your business as a manufacturer, distributor, retailer, or some combination of all three, APTC's IMS will help you in the day-to-day work of making, buying, and selling your products to your customers.

Features, Features, Features

APTC's IMS is designed to work with you to control your business in three broad areas: buying, selling, and accounting. We've paid close attention to detail—and APTC's IMS is more complex than we'll describe—but here is an overview of its functions:

Inventory Management System Product Highlights

by Thomas N. Ronayne

Buying

There are three *processes* used in APTC's IMS to manage-and-control the buying process:

► *Item or Catalog Management*—a file, or list, of the items you buy and sell that includes item model or part-number, vendor, manufacturer, item group and category, pricing (regular sale, promotion sale, distributor sale), standard cost, and sales tax status.

► *Vendor Management*—a file of the manufacturers you buy from similar in form to the vendor file.

► *Purchase Order*—this process uses the information in the Item, and Vendor files to create a purchase order as "automatically" as possible.

Your *control* is that you may not buy something; i.e., a purchase order may not be "generated," for any products or services that do not exist in your Item file, or for any vendor that does not exist in your Vendor file.

After you've created a Purchase Order, and sent it to your Vendor, he'll provide you with the goods or services you've bought:

► *Receiving Order*—the "compliment" of the Purchase Order, the Receiver is the way to add items to inventory as they arrive from the vendor..

The Receiver also creates your account payable record. Your *control* is that no items may be received without a matching Purchase Order, item by item, quantity by quantity.

Selling

APTC's IMS provides different ways of selling your goods and services, depending on whether you sell in a retail, distributor, or combination of retail and distributor way.

For the "strict" retailer, there is point-of-sale. For the distributor, there is customer order, shipper, and invoice. There are always exceptions—distributor's occasionally have counter sales, retailers ship, say, gifts to other cities—so we include all sales methods in APTC's IMS. This flexibility means you can use any of its features in any way that you choose.

► *Point-of-Sale*—this process is used at the point-of-sale for immediate delivery of goods to the customer; e.g., at a sales counter.

Point-of-Sale may be used with handwritten sales tickets, as a sales-ticket "generator," or with intelligent cash registers (we customize the Point-of-Sales process for your particular needs). Point-of-Sale records sales by department and individual sales representative, and includes the capability of accepting any combination of cash, check, credit card, or store credit.

When an entry is made through Point-of-Sale, your inventory is adjusted; i.e., you always have inventory levels at your fingertips.

► *Customer Management*—a file of your customer's information including "mailing" name and address information, "billing" name and address information, and "shipping" name and address information.

Customer Management is used by distributors for direct customer sales, shipping, and invoicing.

Retailers use Customer Management for store credit, layaway sales, out-of-area sales (for example, out-of-state gift shipments), and for direct mail promotional literature.

► *Sales Order*—this process uses the information in the Item and Customer files to create a Sales Order, like the Purchase Order, as "automatically" as possible. The Sales Order is the basic selling document for distributors and retailer's layaway and out-of-area sales.

Shipping, Invoicing, and Receipts

► *Shipping Order*—this process com-

pliments the Sales Order in much the same manner as the Purchase Order-Receiving Order pair. The Shipper subtracts items from inventory. Your control is that no items may be shipped without a matching Sales Order, item by item, quantity by quantity.

► **Invoice**—this process is used if you sell on credit terms and for retail lay-away's. Invoices may be created from Sales Orders or from Shipping Orders depending on how you want to create customer invoices. The Invoice creates your account receivable. Your control is that no invoice may be created without a matching Sales Order.

► **Receipts**—this process is used if you sell on credit, pre-paid or back order, or lay-away terms. The Receipt updates your accounts receivable. Control is achieved by cross-checks to either the Point-of-Sale or Sales Order processes.

► **Payables**—this process is used when you pay your vendors. The Payables updates your accounts payable. Your control is that no payment may be made without a matching Purchase Order and Receiver.

The Problem of Canned Software

You may have looked at software "packages." If you looked hard, you may have noticed that many software packages are generalized; i.e., they fit the most-common case. You've probably noticed, too, that you're not the most common case: you're special, and you'd like your computer systems to fit your needs instead of the other way around.

Well, APTC's IMS was purposely designed to be as flexible as possible so it can fit *your* needs instead of forcing you to change the way you do business to fit *its* needs—we think that's the right way to do things.

Have It Your Way

APTC's IMS is "canned" to some extent—we ask you to keep track of things in certain ways—but we think you'll agree that APTC's IMS is more like you do business than anything else you'll find. APTC's IMS was designed in modular form so we can quickly and easily change it to fit your particular needs.

We believe in the "people should think, machines should work" philosophy, and we've carried that through all of APTC's IMS. We also believe in making machines do whatever they're capable of doing.

For example, we've built our reports to use the special-effects capabilities of our printers, so we don't use any expensive pre-printed forms—saving you the cost of buying them.

However, we've found that some of our customers like to use pre-printed forms, so we've made everything adap-

table. If you want to use special pre-printed forms (for, say, point-of-sale customer receipts), we can adapt the reports to them, quickly and easily.

Internal Controls

Your accountant has probably talked to you about internal controls: e.g., you should be using a purchase order for everything you buy (so you don't pay an invoice that just "arrives" in the mail); you should be creating a sales order and invoice for everything you sell; you should have a receiving document that matches your purchase order; you should have a payment advice that matches your purchase order and includes your check information; you should separate the purchasing and paying functions.

APTC's IMS includes these controls—along with many others—so that you *do* have control over these critical functions. The buying, selling, and paying people are separate, and APTC's IMS makes sure that the "wrong" people don't have access to things they aren't supposed to.

Reports, Reports, Reports

APTC's IMS includes several reports. We designed our reports so they're brief and to the point; i.e., we use what's called "exception" reporting instead of the more common "everything" reporting. That means that you don't get 2-inch thick stacks of computer paper on your desk to wade through; instead, you get a few pages that summarize the information you're interested in so you can tell—at a glance—where you stand. If you want the 2-inch stack, you can get it; but, we've found that most people both don't want and can't use the volumes of information found in most reports, so we've made the effort to let the computer's "fingers do the walking," instead of yours.

The common reports—purchase order summaries, back-orders, sales, accounts receivable (with ageing), accounts payable (also with ageing)—are all part of APTC's IMS. Not so common reports are also part of APTC's IMS: inventory turnover (what's moving and what isn't); inventory re-order points; automatic (under your control) re-order; automatic customer statement preparation; asset management.

Multiple Locations

APTC's IMS is designed to work in many situations. If your business is in one location, APTC's IMS will work for you in that single location. If your business has multiple locations, APTC's IMS will handle product distribution from your receiving location or warehouse to your other locations. If you're in a single location now and are planning on expanding, it doesn't cost anything to do so—the capability is

built-in, standard equipment.

Sensible Options

The food industry has led us all in adopting and using Universal Product Codes (UPC), most commonly a 12-digit bar code pattern that appears on almost every product in grocery stores. Other industries are adopting this inexpensive way of handling the incredible job of keeping track of hundreds—or thousands—of individual products offered for sale by many businesses.

There are eight commonly-used bar code schemes, and we've built APTC's IMS to handle every one of them. Not everybody needs or can use bar codes, so we've made bar code equipment an option with APTC's IMS; when you're ready, we're ready.

We think that computers are great tools—after all, we're in the computer business. We also think that computers should be used for more than just one job. APTC's IMS does several jobs, but, in its own way, it is somewhat of a one-job system. We think you should consider your other business needs in addition to buying and selling.

We prepare documents, write letters, and analyze our business situation just like you do. We write with an office automation system, and we analyze with a spreadsheet system—we consider them basic tools, and have forgotten how to use pencils, paper, typewriters and calculators (well, not really, but you get the idea). So we urge you to consider buying an office automation and spreadsheet package for your other information processing needs.

How Does It Work

APTC's IMS works with a computer system. The computer system includes the computer itself, a terminal for each system user (you can have up to 64 users at any number of locations), and at least one printer (you can have up to 64 printers).

APTC's IMS is built in a relational data base management system (RDBMS). Because it is built in an RDBMS, you can—when you want to—"roll your own" applications and reports; i.e., you're not limited in what you can do with your system and your information, and we'll teach you how to expand and grow when you're ready.

You can, of course, use the RDBMS for other applications—you can create them or we will for you—like payroll or personnel management. The RDBMS is a tool—just like a hammer or screwdriver—and you can use it to "build" whatever you'd like; again, we'll be happy to do it for you or teach you how.

What Else Is There To Know

We chose carefully when we chose

the computer system. We chose Cromemco computer systems for our "hardware," and we chose AT&T's UNIX System V as our operating system of choice.

Why?

We chose Cromemco computer systems because they're tough, dependable, upgradable, and easily expandable. Cromemco has been building computer systems for business, industry, and the military for over 11 years, and many systems placed in service 10 years ago are going strong today and will continue to for the future.

Computer technology has changed and will continue to change. Our experience with Cromemco has been that technological changes have not made our existing systems obsolete; i.e., when improvements have been made, our existing software continues to work—as expected—without any re-writes or other modifications. There aren't many computer systems out there that can say that.

We chose AT&T's UNIX System V operating system for the same reasons. UNIX System V has become the industry standard operating system; most manufacturers either offer UNIX System V now or are about to for their products.

The combination of Cromemco computers and AT&T's UNIX System V gives you a high performance, expandable, dependable powerhouse for years to come.

Here are a couple suggestions of things you can grow into:

If you publish a catalog, you can use the document processing and publishing tools that are part of UNIX to typeset your catalog from your item information directly in your own system, producing camera-ready copy on, say, a laser printer.

Using UNIX' powerful text formatting programs, you can produce individually-addressed, typed letters to every customer in your Customer file.

What About Other Operating Systems

APTC's IMS works with any operating system that supports the RDBMS; e.g., if you already own a Cromemco computer system and are running Cromemco's Cromix-Plus operating system, APTC's IMS is completely portable to Cromix-Plus.

We can "port" APTC's IMS to other operating systems that support the RDBMS; e.g., MS-DOS, Xenix, UTS, Venix, IX/370, but prefer UNIX System V or Cromix-Plus—because of the features, standardization, and supplied utilities of those operating systems; we think you will, too.

Multi-User/Multi-Tasking

We said that you can have up to 64

users. That means that the computer system is what's called "multi-user." Because you can have up to 64 people doing different things at the same time means that the operating system is "multi-tasking."

Do you buy 64 users "worth" to start? No.

The basic system can support a combination of eight terminals or printers plus a system control terminal; e.g., you always have one terminal for system control, plus, say, six terminals and two printers, or one terminal for system control plus seven terminals and one printer.

How we configure your system depends on what you need; if you only need a system control terminal and two additional terminals and a printer, no problem—that's all you buy; but, you can simply "plug-in" additional terminals or printers up to the first eight.

Then, to expand, you add an additional set of "channels," eight at a time. You buy only what you need, and we "plug-in" additional hardware as you need it.

What this means is this: you can grow as you need to, and it doesn't cost a lot to do so; e.g., an additional 8-channel input/output board costs \$795 plus about \$100 worth of cables.

What About License's For More Users

There is no additional charge for APTC's IMS for any additional users—you can go from one to 64 users without spending anything extra. There is, however, a charge imposed by AT&T for more than 16 UNIX System V users.

How Complicated Is It

We purposely designed APTC's IMS to work for you. That means that you don't need to know anything about computers to use it. APTC's IMS works from menus—you select what you want to do, and APTC's IMS does it.

What About Installation and Training

We consider installation to be part of the price of the system; i.e., there's no additional charge for installing your system on your site. We can't do telephone work, and we can't do electrical work—you'll need at least one dedicated telephone line and one dedicated electrical line.

You'll also want a place to keep your system that's safe, relatively free of dust and dirt, and can be kept cool—an office environment is fine—if you're comfortable, the system will be too—but we recommend a lockable area about the size of a small office.

We also provide four days on-site training for you and your people. Training is part of the system price.

How Many People Do You Need?

You need one person—part time—to be the System Administrator. System Administration means starting and stopping the system, adding users, doing back up, and other things. In budget terms, the System Administrator is about 1/100 person; i.e., he or she will spend about 1% of their time taking care of the system. You don't need high-priced programmers.

What About Security

Security is important. We'd all like to believe that everybody is honest, but the sad fact is that people can be tempted and that temptation costs business money.

We chose AT&T's UNIX System V or Cromemco's Cromix-Plus operating systems for our computer systems for many reasons—one of them is the security they provide. UNIX' and Cromix-Plus' security is based on user "login" and password protection; i.e., every system user has an account name and a password (known only to the user) that protects his information from unauthorized access by others.

APTC's IMS uses the login information to provide security; e.g., only the, say, "buyer" is allowed to add, change, or remove items information; only the "accountant" is allowed to create payments; only authorized people may "see" cost information, etc. We've built-in several security features to assure the integrity of your system and the information it contains.

What About Maintenance

There is no need for continuous maintenance, and we don't sell hardware maintenance contracts. If something breaks—which is extremely rare—we'll fix it, and we'll bill you for service after the manufacturer's warranty period. We've found that most problems are "telephone-able," and we prefer to work that way—we think you will too.

Software maintenance, though, is a bit different—we do sell an annual software maintenance agreement. APTC's IMS is not a static product—it grows and changes. Whenever an APTC IMS user has a suggestion that we think will benefit all users, we incorporate it into APTC's IMS. Too, if we find a better way to do something (we're constantly reviewing our products for improvements), we'll incorporate the better way. An annual software maintenance agreement assures you that you'll always have the latest improvements in your system (you receive at least one system upgrade per year with an annual software maintenance agreement).


What Else Do You Need

Frankly, nothing: APTC's IMS is com-

plete as-is. If you need and want to do your own custom programming, we have all the tools you'll need—computer languages like Basic, C, Cobol, Fortran, and Pascal are all available. If you'd like us to do custom programming for you, we're ready, willing, and able to do so. You don't need—and you don't buy—any of these to use APTC's IMS.


ADVANCED PROGRAMMING TECHNIQUES CORPORATION

P.O. Box 19549
Detroit, MI 48219
(313) 835-0808

Thomas Ronayne is President of APTC, and the column editor for "SOFT TOOLS," which appears regularly in I/O NEWS. 

dBase To Informix

Continued from page 13

since 1978. He is presently the Medical Director of the Ontario Poison Information Center, Children's Hospital of East Ontario, 401 Smythe Road, Ottawa, Ontario K1H8L1, Canada. 

ONLY ONE
COMMUNICATIONS
PROGRAM HAS BEEN
CALLED EASIER TO USE
THAN CROSSTALK,
SUPPORTS RFILE, SFILE,
3102 TERMINAL
EMULATION, AND A FILE
TRANSFER PROTOCOL
THAT'S NAMED AFTER A
FROG.



Yep, it's true. Only one program has what it takes to be set apart from the rest. Sure, we put in features like Xmodem, DEC VT-100 and VT-52 emulation, but we didn't stop there. If you're looking for a powerful communications program to help you share information with public information services, BBS systems, and your Cromemco systems, the answer is staring you right in the face.

Now all versions of ProCall, and ProCall/PC plus support the Kermit file transfer protocol, and we've made several other changes that won't go unnoticed either. Ask your dealer about ProCall and ProCall/PC. Or ask us: FrodoMatrix Software Development, 1145 Park Heights Drive, Milpitas, CA 95035 USA (408) 263-8665



Figure 2: Example ACE Report Source Listing

```
{Example ACE report}

database poisonctr end

define
  variable      dtwo      type character length 8 {date to work on}
end {define}

input
  prompt for dtwo using
  "Please enter date to summarize (dd/mm/yy): "
end {input}

output
  report to "POISON.RPT"
  top margin 2
  left margin 10
  right margin 95
  bottom margin 4
end {output}

read
  into x
  lastname,firstname,phone,date_call,time_call,poison
  where date_call = dtwo
end {read}

sort by poison,lastname,firstname
end {sort}

format

page header
print "REPORT OF POISONINGS FOR: ",dtwo
print "-----"
skip 1 line

before group of poison
print "***** Substance involved: ",poison clipped," *****"
skip 1 line

on every record
  print column 5,lastname clipped," ",firstname clipped,column 50,
    phone,column 65,time_call

after group of poison
print "=====> Total ",poison clipped," calls: ", group count using "###"
skip 2 lines

on last record
  skip 3 lines
  print "-----"
  print "Total Poisonings for this date: ",count using "#,###"
  print "-----"

end {format}
```

Figure 3. Example ACE Report "Printout"

```
REPORT OF POISONINGS FOR: 01/01/87
-----

***** Substance involved: Arsenic *****

Adams, Mary                      999-111-2222   01:15
=====> Total Arsenic calls:      1

***** Substance involved: Cyanide *****

Bell, John                      999-222-3333   03:30
Smith, Mary                     999-333-4444   14:20
=====> Total Cyanide calls:      2

***** Substance involved: Strychnine *****

Doe, John                      999-737-1100   13:35
=====> Total Strychnine calls:   1

-----
Total Poisonings for this date:    4
-----
```




Winning at Copyrights

by Paul Hentzel

Preparing Your Software Copyright Application

Attorneys and Fees

Most patent attorneys, such as myself, routinely prepare copyright applications on computer software. Attorney fees may run from \$120 to \$180 for the first application, and less (about \$75) for subsequent related applications. The first application normally involves a short "copyright lecture" and "question-answer period" by the attorney, and then a data transfer (your name, title of the work, etc.) to a paralegal.

Once the law firm has your initial "base" information, subsequent applications are normally prepared by a paralegal or experienced legal secretary. Preparing ten or so software applications at one time is a highly redundant activity. There is definitely room to negotiate a bulk price for the entire job.

I advise my clients to let me assist them with the first application. We go over the entire form TX and deposit requirements (program code). I explain each entry. After the first application is filed, I urge them to prepare subsequent applications in-house using the first application as a model.

Many Applications

If you plan to file numerous applications covering your backlog of programs, you should definitely consider an in-house effort. With almost any word processor, you can easily create a master file with entries positioned to match the copyright application format. You then merge in the information for each application into the master entries, and print it out on a copyright application form.

The master file should contain the following items:

- ▶ *Transmittal Letter* (standard cover letter to the Copyright Office).
- ▶ *Application Entries*.
- ▶ *Check for \$10.00*.
- ▶ *Return Postcard* (optional—receipt).
- ▶ *Address label for the CO*.
- ▶ *Handy File Card* (optional—rolodex or 5x8).

Before you develop this master file, call me. I will send you the master file that I developed over the years and use everyday (Screen, CDOS 2.54, 8").

Getting Started

The first step in filing for a copyright registration on your software, is to obtain a copyright application form TX from the US Copyright Office (CO). Write to:

Copyright Office
Library of Congress
Washington, D.C. 20559

and ask for 25 TX forms (at least one with instructions). It takes about three weeks for the CO to respond. If you are in a hurry, call me and I will send you a TX form (with instructions) the next day.

TX stands for "text." Software is currently considered to be a literary work by the Copyright Office (just like "Gone With The Wind").

Your original application paper will be examined and stamped by a Copyright Examiner at the CO, and will bear the official Certificate of Registration. For this reason the original application must be on a Copyright Office form. You are not permitted to make up your own form, or to use photo-copies of the Copyright Office form.

The application contains 11 simple

sections:

- (1) TITLE OF WORK
- (2) NAME OF AUTHOR
- (3) YEAR OF CREATION
- (4) CLAIMANTS
- (5) PREVIOUS DESIGNATION
- (6) DERIVATIVE or COMPILATION
- (7) MANUFACTURERS
- (8) REPRODUCTION FOR BLIND
- (9) DEPOSIT ACCOUNT
- (10) CORRESPONDENCE
- (11) MAIL CERTIFICATE

We will discuss each section separately.

(1) TITLE OF WORK

The title must identify your work for the CO archives. Descriptive titles are traditional, such as "Word-Processing Program." However, code titles, such as "WPP(1.19)86" will suffice for CO indexing purposes. A very handy format is a short descriptive title plus the version number.

(2) NAME OF AUTHOR

For copyright purposes, the author is the creator unless the program is a "work for hire" in which case the author is the commissioning party. If you wrote the program as part of your job at work, the author is your employer. In work for hire situations, the actual creator does not get mentioned in the copyright application. I suppose you could put his initials in the title code for some recognition at least.

The nationality and domicile of the author (creator or sponsor) determines whether the work is covered by the Universal Copyright Convention (UCC). Most works are within the UCC.

The date of birth and death are required to determine the expiration date of the copyright. For individual authors the copyright extends for the life of the

FORM TX
UNITED STATES COPYRIGHT OFFICE
REGISTRATION NUMBER

TX TXU
EFFECTIVE DATE OF REGISTRATION
Month Day Year

DO NOT WRITE ABOVE THIS LINE. IF YOU NEED MORE SPACE, USE A SEPARATE CONTINUATION SHEET.

1 TITLE OF THIS WORK ▼			
PREVIOUS OR ALTERNATIVE TITLES ▼			
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Figure 1: Front Side of CO Form TX

author plus 50 years. For corporate authors, the copyright extends for 75 years from the date of publication, or 100 years from the date of creation, which ever is shorter.

(3) YEAR OF CREATION

The year of creation and a date of publication determine the duration of work for hire copyrights. Creation means completion of work. Publication means distribution to the public by sale or otherwise. When the exact date of either is in doubt, it is a good idea to favor early creation and publication dates over later dates. This preempts the accusation that your employer fraudulently extended the copyright period by alleging later dates. Favoring early dates means a slight loss in duration balance. However, the effective loss is zero in view of the fact that your

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Enter the name of the Copyright Claimant in Space 4. The Copyright Claimant is the present owner of the copyright interest in the software work, and is usually the author (individual, corporation, or partnership) entered in Space 2 (the creator or his employer). However, the Copyright Claimant/present owner may have acquired ownership through assignment by the author. Non-author claimants must enter the nature of their ownership as TRANSFER in Space 4.

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Only one Copyright Registration should normally be issued for each work. If the work has been previously

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1) The prior registration was for the unpublished work, and this registration is for the published work. Software authors typically do not file for copyrights on unpublished software.

2) The prior registration was erroneously filed by a different claimant, and the present registration is your first registration on the work. This usually does not occur either.

3) The prior registration was for an earlier version of the present work, and this registration is for the substantially improved present version. The improved material may be copyrighted as a derivative work based on the prior work. This happens a lot.

(6) DERIVATIVE WORK

Space 6 is for derivative works only. The pre-existing work must be identified on line "a," and the added material must be identified on line "b." A version number and short description will do.

(7) MANUFACTURERS

Space 7 concerns only non-dramatic literary material in the English language. Software languages are not considered English by the Copyright Office. Therefore software applicants may leave Space 7 blank.

(8) USE OF BLIND

The Library of Congress has a Braille edition program and a recording program for the blind. The social policy behind the program is not geared toward software, and it probably makes no practical difference whether you check a box in Space 8 or not. I normally do not.

(9-top) DEPOSIT ON ACCOUNT

Individual applicants usually do not have a Deposit Account with the Copyright Office, and should leave the top part of Space 9 blank. Corporations filing lots of Copyright Applications may be interested in opening a deposit account, instead of writing so many \$10 filing fee checks.

(9-bottom) CORRESPONDENCE

Enter the name, address and telephone number in the bottom part of Space 9 for the party to be consulted if correspondence between the Copyright Office and the Applicant is necessary. This would be the individual author/applicant, or the employee assigned to the "Copyright Detail" (VP of Copyrights).

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Space 10 identifies the legal capacity of the person who signs the Application Form, and certifies that all entries are true. If you are an individual author preparing your own Copyright Application, you should check the 'author' box, print your name and the date, and sign on the bottom line of Space 10. An application for a Corporation should be signed by the VP of Copyrights.

(11) MAIL

Enter the address to which you want the Certificate of Registration sent. This address will normally be the same address as the Claimant (owner) in Space 4, and the correspondence address in Space 9. Nevertheless, a current address must be entered because Space 11 serves as the window address for the Copyright Registration envelope from the Copyright Office.

Help

This concludes the instructional material for preparing your own copyright application on your software. Further information for troublesome areas may be found in:

HOW TO COPYRIGHT SOFTWARE
by Salone and Elias 1984

LEGAL CARE FOR YOUR SOFTWARE
Remar, Daniel 1982

both available from NOLO Press, 959 Parker Street, Berkeley, CA 94710.

If you have any questions or suggestions for future articles you may contact me directly at:

Paul Hentzel
Patent Trademarks Copyrights
441 Nevada Avenue
Palo Alto, CA 94301
(415) 326-8254 9am-midnight

Editor's Note: Paul Hentzel has been advising Cromemco, Inc. on copyright matters since 1976. The next installment will cover international copyrights on software.

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☐ This is a changed version of the work, as shown by space 6 on this application.
If your answer is "Yes," give: Previous Registration Number ▼ Year of Registration ▼

DERIVATIVE WORK OR COMPILATION Complete both space 6a & 6b for a derivative work; complete only 6b for a compilation.
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b. Material Added to This Work Give a brief, general statement of the material that has been added to this work and in which copyright is claimed. ▼

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☐ owner of exclusive right(s)
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Figure 2: Back Side of CO Form TX

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Using 68Kalc

A Spreadsheet Tutorial

by Joseph L. Brothers, C.C.P., C.D.P.

Now that Cromix-Plus has a spreadsheet, **68Kalc**, Cromemco users who haven't snapped up a copy yet may well be pretty curious about it. To introduce the tutorial that follows, we'll briefly fill you in on its background, describe its abilities, and demonstrate its usefulness with a working example.

History

Less than six months ago, the 68Kalc project began with a short survey mailed to 200 *I/O NEWS* subscribers. Your responses were so positive that Warecraft bought source for a skeletal Unix spreadsheet, scrounged up a compatible terminal library, chanted in unison, "We understand it completely, what could go wrong?" one hundred times, and proceeded to learn once again—in terrifying detail—that Cromix Is Not Unix. What resulted is a spreadsheet program that interfaces neatly with Cromix-Plus, runs with varying sophistication on a variety of terminals, and uses the 680XX to calculate with over a million cells in main memory.

Terminal Magic

Before discussing the spreadsheet program in more detail, it will be useful to explain a bit about how the **ncurses** window library, which does 68Kalc's terminal handling, works with Cromix-Plus termcaps. Unlike CE, **ncurses** requires very few terminal capabilities to run. In the worst case, with minimum capabilities, **ncurses** will send line-feeds, then rewrite characters to position the cursor, and rewrite the screen to scroll down. The more capabilities (insert/delete line, insert/delete character, clear-to-eol, ...) included in the termcaps definition for a terminal, the faster and more sophisticated **ncurses** can be in updating the screen. This scheme permits 68Kalc to run even on very dumb or very strange terminals, with some speed penalty. The sample termcaps file included on the 68Kalc distribution disk contains a number of terminal

definitions which demonstrate the range of terminals which can be supported.

Terminal-handling is more voodoo than science: setting out generally useful heuristic incantations in full would fill a book. If you need help with termcaps customization, in lieu of that book Warecraft maintains a toll-free 800 number for dispensing advice and/or commiseration and for listening to gripes, complements, and suggestions. Call it.

Spreadsheet Motherhood

By now, most everybody knows that a spreadsheet program is just a sheet of accountant's ledger paper "brought to life." An accountant using a ledger would write down a column of numbers, total it, and write the sum at the foot of the column. When any number changes, the accountant must re-add the column, using a formula stored in his head, and rewrite the sum. With a spreadsheet program things are a little different. Starting in the upper left corner of the "paper," columns are automatically lettered from A and rows are numbered from 1. Using the program, you first enter the formula to sum the column into the cell at the foot of the column (in 68Kalc it might be `+B2..B14`). Then you watch the sum displayed there change as you enter each number into the column. Once all the numbers are entered, the sum is (still) automatically correct. When you change a number, the program re-adds the column using the formula you entered and displays the new sum. These features, automatic recalculation and stored formulas, are the "life" in a spreadsheet program.

In the sample spreadsheet, which we will get to in a moment, several kinds of formulas are used in addition to the simple sum just mentioned. Every formula is either an arithmetic or a conditional expression which evaluates to a number. An example of an arithmetic expression is `"= 127 + 1"`; which evaluates to 128, as expected. Conditional expressions use syntax similar to that in the C language: an example is `"= (A1 > 0) ? 1 : 0"`; which evaluates to 1 if the contents of cell A1 are greater than 0, and to 0 otherwise. These two examples contain instances of four essential elements of formulas: constants (127, 1, 0); cell references (A1); arithmetic operators (+); and conditional operators (> and ? :). Constants are just numbers, as you can see. Cell references in formulas mean "use the contents of the cell named here." Those contents must be a number or evaluate to a number, not a label. The operators used in the sample will be explained as they go by. All the operators are listed in the 68Kalc help file, which bears reviewing.

Cell Warning

Two points should be clarified about cell references. First, a cell reference's meaning depends on where it is used. In a formula, A1 means evaluate a cell, and it will always result in a number. In a Goto command A1 means go there. In a Print, Format, Erase or other cell range command it limits the effect of the command. In a Copy command it causes the duplication of cell contents, including formulas and labels. Second, cell references can change during a Copy command to maintain

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	From	101						Starting	Balance				
2	To	117							100.00				
3	Check	Date	Transaction		Amount	Mach	Fee	Deposit	Balance				
4	101	10/22	Payee		13.00	30	0.50	200.00	256.50		1	1	1
5	102				0.00	0	0.00	0.00	256.50		0	0	0
6	103				0.00	0	0.00	0.00	256.50		0	0	0
7	104				0.00	0	0.00	0.00	256.50		0	0	0
8	105				0.00	0	0.00	0.00	256.50		0	0	0
9	106				0.00	0	0.00	0.00	256.50		0	0	0
10	107				0.00	0	0.00	0.00	256.50		0	0	0
11	108				0.00	0	0.00	0.00	256.50		0	0	0
12	109				0.00	0	0.00	0.00	256.50		0	0	0
13	110				0.00	0	0.00	0.00	256.50		0	0	0
14	111				0.00	0	0.00	0.00	256.50		0	0	0
15	112				0.00	0	0.00	0.00	256.50		0	0	0
16	113				0.00	0	0.00	0.00	256.50		0	0	0
17	114				0.00	0	0.00	0.00	256.50		0	0	0
18	115				0.00	0	0.00	0.00	256.50		0	0	0
19	116				0.00	0	0.00	0.00	256.50		0	0	0
20	117				0.00	0	0.00	0.00	256.50		0	0	0
21													
22	17	Checks						Ending	Balance				
23		Total Amount of checks			13.00				256.50				
24	1	Cash Machine Withdrawals											
25		Total Cash Amount			30.00								
26	1	Fees											
27		Total Amount of Fees			0.50								
28	1	Deposits											
29		Total Amount of Deposits			200.00								

Figure 1: A 68Kalc "Check Register" Spreadsheet

their offsets in formulas. For instance, if you Copy the column of numbers from the ledger paper example, above, to column C, the formula in the cell at the foot of the new column will read C2..C14. The only time formulas are not adjusted this way during a Copy is when the new cell references would reach beyond the edge of the spreadsheet.

Spreadsheet Programming Sample: Yet Another Simple Check Register

Start the program. If you followed the suggestion in the installation documentation, your working copy of the spreadsheet program is called /bin/68kalc.bin. If not, it may still be something like /bin/68kalc256.bin. For this exercise, we will assume you were suggestible. Issue the command 68kalc. You should see the copyright notices, then an empty spreadsheet: [A1] in the upper left corner of your screen, [COMMAND] in the upper right, the letters "A B C D E F G H" spaced along line 4, and the numbers 1-20 running down the left margin. If things get weird at any time, you can always return the program to sanity by pressing [ESC], usually no more than twice. This should erase any error messages except "Proceed?" and put the [COMMAND] mode back in the upper right corner. The "Proceed?" messages require a "y" or "n": "n" is safe.

Keystrokes: 68Kalc

The first feature to locate in new software is always Help: if your function keys are installed and working, [F1] will bring up Help; the question mark key, ?, is the alternate way to open the Help window. Scroll down a few lines with your down-arrow key to the "How to use Help" section, where you will see that the Escape (termcaps kE) key returns you to the spreadsheet, leaving the Help window open.

Keystrokes: ? 12 [DOWN] [ESC]

Just to show that you are running a Cromix-Plus spreadsheet, press the percent sign key, %, to exit to a shell. Your screen will have cleared except for the reminder that EXit or [CTRL-Z] returns to 68Kalc. Go ahead and press [CTRL-Z] now.

Keystrokes: / [CTRL-Z]

Once the spreadsheet is back on-screen, press [F1] or ? twice to close the Help window. You can get it back anytime the [COMMAND] mode shows in the upper right of your screen just by typing a single [F1] or ?.

Keystrokes: ? ?

Now that you can see a blank spreadsheet covering the whole screen, take a moment to explore all the ways to move the cell cursor. Pressing each of your terminal's arrow keys in turn will move the cell cursor to identify it. Typing a number, like 11, then the right-arrow key will move off the right edge of the screen, forcing 68Kalc to adjust the display window. The Goto command, G or [F5], followed by a cell name jumps directly to that cell. The Home command, either H or your terminal's home key (if you defined it in termcaps) will move the cursor back to cell A1.

Keystrokes: [DOWN] [RIGHT] [UP] [LEFT]
11 [RIGHT] G E17 G ZZ1000 H

Now that the cell cursor is under control, it is time to enter labels for the data that will fill the check register. We'll enter them first, set the column widths for a better appearance, and then check the result. To enter the first label, make sure the cell cursor is in cell A1 with the H command, then enter the key for a left justified label, the single quote, '. This must be the forward single quote, not the backquote. If you got the right one, the mode in the upper right corner of your screen will change to [ENTER]. Type in the first label, From, followed by

[RETURN]. Your entry goes onto the top line of the screen until you press [RETURN], then it is moved to the cell indicated at the upper left.

Keystrokes: H ' From [RETURN]

Most of the Cromix-Plus Retype/History command keys are usable for editing in 68Kalc. If they are defined in your terminal's termcaps definition, you can use them to correct a label or formula during entry or with the Edit command, E or [F2]. Common values for these keys are [DEL] for delete, [TAB] for insert, and [BACKSPACE] to move left. The insert command is a toggle and is overridden by [RETURN], just as in retype. If your terminal sends the same sequence for backspace and left-arrow, you will need to define an alternate backspace: see the kbx capability in the termcaps section of the 68Kalc installation chapter. If you would rather re-enter the label or don't like the results of editing, move the cursor to the offending cell and erase it with the Range Erase command. Then try again.

Keystrokes: E [BACKSPACE] [DEL] [INS] m [RETURN]
(or to erase) H / R E [RETURN]

Once you can enter a cell to your satisfaction, put the rest of the register header labels in: put the cell cursor in the cell indicated below, type the label format/entry key, then the text, followed by a [RETURN]. You will find that ' left justifies the label and overlaps to the right, ^ centers the label, and " right justifies it. Remember to move the cell cursor: [RETURN] only

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completes an entry.

Labels: A2 ' To
A3 ' Check
C3 ^ Date
D3 ^ Transaction
E3 " Amount
F2 " Cash
F3 " Mach
G3 " Fee
H1 ' Starting
H3 " Deposit
I1 " Balance
I3 " Balance

Now enter column widths to make the screen look better. Column widths are set column-by-column with the [/ W C S] command and affect the current column. Move the cursor to the indicated column, then enter [/ W C S], the width, and [RETURN]. The first two are spelled out.

Keystrokes: H
/ W C S 4 [RETURN]
[RIGHT]
/ W C S 2 [RETURN]

Column To Move To	Column Width To Set
A	5
B	2
C	6
D	20
E	8
F	5
G	5
H	8
I	8
J	8
K	3
L	3
M	3

After using the Home command, your screen should look like the first three rows shown in Figure 1.

If it does not, some combination of Edit and / R E will put things right. When the screen looks the way it should, save what you have so far in a file.

Keystrokes: / F S check [RETURN]

Now that the columns are identified, it will be easier to locate the formulas as they are entered. Move the cursor to cell C1 and press = to begin entry of a formula. The mode will change to [ENTER], and the = will not show. If anything else happens instead, press [ESC] and try again. Once the [ENTER] mode displays, type in the beginning check number for this month's register. We'll use 101 here. You may Edit this entry, and you must press [RETURN] when it is complete.

Keystrokes: G C1 [RETURN] = 101 [RETURN]

The value that shows up in cell C1 will be 101.00, which is nonsense. Check numbers are ordinal (integer), not real. Change the display to integer in this column from the default precision of 2. Use the Range Format command, / R F F and enter a 0 over the number displayed, completing the entry with [RETURN]. Do the same thing in column A, to set the rest of the check numbers to integer.

Keystrokes: / R F F 0 [RETURN]
H
/ R F F 0 [RETURN]

Now enter the last two entries in the header. Go to cell C2 and put in the formula for the ending check number. Then put a beginning account balance in I2.

Keystrokes: G C2 [RETURN] = A20 [RETURN]
G I2 [RETURN] = 100 [RETURN]

The formulas and labels for the first line of the check register's entries are entered similarly. Move the cell cursor, type = or one of the label keys ', ^, ", and enter the cell contents from the table below. Complete each cell's entry by pressing [RETURN].

Column To Move To	Value to Enter
A4	= C1
C4	' 10/22
D4	' Payee
E4	= 13
F4	= 30
G4	= 0.5
H4	= 200
I4	= I2 + H4 -G4 -F4 -E4
K4	= F4 ? 1 : 0

This last formula will have displayed three asterisks in cell K4. That is correct, since the column width is three and the default precision is 2. The *** means 68Kalc cannot fit ".00" into the cell. Change the precision to 0 with the Range Format command.

Keystrokes: / R F F 0 [RETURN]

We still need two more formulas like the one in K4, so move the cursor to cell L4 and start the Copy command. Read the Copy prompt carefully. Copy works just like the = command: start with the cell cursor where you want the result to end up. Use the left-arrow key to move to K4 at the Copy prompt, then press [CTRL-V] (or its equivalent in your termcaps definition). If your termcaps has no entry for kat, the mode will display as [CMD ERR]. Just type K4 if you got [CMD ERR]. Press [RETURN]. You may want to Edit the new cell contents to see what Copy does. Press E or [F2] to see "G4 ? 1 : 0.", then press [ESC] to avoid editing the cell. Copy into M4 from L4 in the same way.

Keystrokes: [RIGHT] / C [LEFT] [CTRL-V] [RETURN]
E [ESC]
[RIGHT] / C [LEFT] [CTRL-V] [RETURN]

Before duplicating this row of values and formulas, change the precision for the cash machine withdrawals to 0. No auto-tellers I know of dispense change.

Keystrokes: G F4 [RETURN] / R F F 0 [RETURN]

Copy row four to row five so we can rapidly fill in the rest of the check register.

Keystrokes: G A5 [RETURN] / C A4..M4 [RETURN]

The formulas and values in this second row need some changes to make them copy perfectly. First, make the check numbers count up.

Keystrokes: G A5 [RETURN] = A4 + 1 [RETURN]

Second, clear out the test data left over from the first line.

Keystrokes: G C5 [RETURN] / R E C5..H5 [RETURN]

Last, edit the balance formula so it will propagate correctly. Move the cell cursor to I5 and either reenter the formula or Edit it to read "I4 + H5 -G5 -F5 -E5", then press [RETURN].

After you Home the spreadsheet, it should look like the first rows shown in Figure 1.

Now save it in the same file, which 68Kalc will remember and display as a default for you.

Keystrokes: H / F S [RETURN]

Populating the spreadsheet is a matter of several area Copies. Move the cell cursor to A6, press / C A5..M5 [RETURN] to duplicate row five to row six. Move the cell cursor to A7, press / C A5..M6 [RETURN] and continue in this manner until the last

row of the check register is on line 20.

Keystrokes: G A6 [RETURN] / C A5..M5 [RETURN]
G A7 [RETURN] / C A5..M6 [RETURN]
G A9 [RETURN] / C A5..M8 [RETURN]
G A13 [RETURN] / C A5..M12 [RETURN]

Use the Home command to verify that the value in cell C2 is 117. If it is not, use the Retype/History key (usually [CTRL-R]) to refresh the screen. If C2 is still not 117, make sure the formula = A20 is really in C2, check that cell A20 contains the formula = A19 + 1, and that all intervening cells in column A count up from 101. Come back to A22.

Keystrokes: H [CTRL-R] G A22

With only a little more work we can add some smarts to what is now a recognizable check register. The smarts are what my bank calls "account analysis services" and charges me \$6.50 a month for.

Enter the analysis labels from this table. Move the cell cursor to the indicated cell, type the label key shown, then the label and a [RETURN].

Column To Move To	Label To Enter
C22	' Checks
H22	' Ending
I22	' Balance
C23	' Total Amount of Checks
C24	' Cash Machine Withdrawals
C25	' Total Cash Amount
C26	' Fees
C27	' Total Amount of Fees
C28	' Deposits
C29	' Total Amount of Deposits

Enter the analysis formulas from this table. Move the cell cursor to the indicated cell, type "=" and the formula and [RETURN].

Column To Move To	Formula To Enter
A22	= 1 + C2 - C1
E23	= +/E4..E20
I23	= I20
A24	= +/K4..K20
E25	= +/F4..F20
A26	= +/L4..L20
E27	= +/G4..G20
A28	= +/M4..M20
E29	= +/H4..H20

Press H and use the arrow keys to view the whole spreadsheet. It should look like that shown in Figure 1.

Save the file.

Keystrokes: / F S [RETURN]

Print it, using 132 column paper or compressed characters.

Keystrokes: / P P G [RETURN]

And Quit from 68Kalc.

Keystrokes: / Q y

Summing Up

If you stayed with me through that, you now have good facility with the basic operations of the 68Kalc spreadsheet. In addition, you have an automated check register that you can extend or customize as you like. To use it, type 68Kalc check at a system prompt, save the spreadsheet as some other name (I recommend checkYYMM), and enter a new starting check number and beginning balance. From there, just enter your month's checks, charges and deposits and watch your balance adjust itself. Anywhere you need to overwrite a number or 0,

the = is optional. If you need more lines for checks, move the cell cursor to row 21 and use the / W I R command for a new row, then copy row 20 into it. You can do this several times, if necessary. Remember to adjust the analysis formulas and the one in cell C2 for the new ending row number.

Naturally, 68Kalc has more features than we have used here, and others are planned for upcoming releases. The priority of particular features is not set in stone for the next release yet. You can influence the future of this product directly by calling or writing Warecraft with your thoughts.

If you would like to comment on this tutorial, ask questions, request enhancements or a copy of this spreadsheet check register, please contact Warecraft at:

WARECRAFT
501 North 36th Street, #138
Seattle, WA 98103
(800) 227-3094

About the Author:

Joseph Brothers is President of Warecraft, Inc., the developers of 68Kalc, and a long-time member of The I.A.C.U. 

FOR SALE CROMEMCO SYSTEM III and SYSTEM ZERO

with 2 recently overhauled PerSci 299B dual drives and a spare 299B. Also, a brand new WYSE 350 color CRT and a Malibu Dual Mode 200 NLQ printer.

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QTY	NAME	DESCRIPTION
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2	256KZ	256K RAM memory boards
2	64KZ	64K RAM memory boards
2	64K	RAM memory boards (Measurement System)—configured for Z80 Cromix
1	Seagate	ST-225 25-Megabyte hard disk
1	STDC	hard disk controller (recently overhauled)
2	TU-ARTS	Serial/parallel communications board
2	16FDC	Floppy disk boards (1 recently overhauled)
1	4FDC	Floppy disk board
1	PRI	New style printer interface
1	PRI	Old style printer interface
1	ZPU	Z80 processor board
3	Misc	hard disk controller boards
1	Dazzler	
1	Joy Stick Controller	
1	SCC	Single Card Computer (Z80)

Cromemco Software:
CROMIX 68000 operating system
CROMIX 68000 'C'
CROMIX Z80 operating system
CROMIX Z80 'C'
Z80 Rattor with Fortran IV
Z80 32K Structured Basic
Z80 COBOL
Z80 Word Processing System
Z80 Trace System Simulator
Z80 Macro Assembler
CDOS Z80 operating system

Miscellaneous software from other sources.

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TEC TIPS is a regular column aimed at providing hints for keeping systems up and running. It will not attempt to deal with specific engineering applications or non-standard configurations. TEC TIPS is edited by Richard Quinn, who can be reached at DataAids, PO Box 4600, The Woodlands, TX 77380-4600. Phone (713)363-3838.

Welcome to Texas

A lot has happened to me since the last time I was able to write this column. I've changed jobs and now work for DataAids, Inc. of Houston Texas. We are experiencing a beautiful fall and enjoy the Texas countryside very much. It is a slower pace of life than California and I enjoy spending more time with my family. (We have recently adopted three little boys that needed a home so I need more family time! It's a good thing I have a computer to MULTIPLY! That makes seven kids and about a 100 friends). My address in Texas is DataAids, PO Box 4600, The Woodlands, Texas, 77380-4600.

Updated Hard disk Information

Table 1 gives the latest hard disk information sheet for various manufacturers STDC-type disk drives. Much of the information is new and some of the old information is updated. There may still be some errors and anywhere there is a "?" means that the information is not known for certain.

If any of you have drives that can be added to this list please send me the information—I'll continue to update the list.

When initializing a hard disk, specify the number of alternate tracks manually. I give about six (6) more tracks than known bad tracks. These 6 extras will provide for future use if needed. The default number of alternate tracks is often far more than needed and wastes usable data area.

Some of the drives listed above are no longer being manufactured but are still in use around the country. Newer drives of the SCSI or ESDI type interface will be coming along and often are similar to the above, and in fact are often the same drive as above but with a different interface type.

The three primary interfaces are the ST-506 type drive originally developed by Seagate Technologies and interfaced through Cromemco's STDC card, the SCSI interface developed over the past few years known as the Small Computer Standard Interface and the ESDI (Enhanced Small Disk Interface) which is an extended version of the SCSI interface. Besides hard disk drives, these newer interfaces are being developed

for tape drives and even LAN products. Generally these newer interfaces have higher data transfer rates and a more intelligent interface card. That is, the interface card on the drive itself takes some of the work off of the system's controller card. Look for these interface standards to replace most of the ST-506 technologies. [See front cover article on Cromemco's new ESDC board—Ed.]

RS-232, A lowly Standard Reaching for the Moon

Issues of connection are becoming the most important topic in today's world of computers. All of the different operating systems, hardware, and software are making this issue more difficult than ever. But the need for computer systems to share information is becoming even more important. The "little micros" now represent a substantial portion of a company's computing power, yet the methods of connecting one system to another are nowhere near as sophisticated as the computers that use them.

Interesting things have evolved out of this desire to connect systems together. The most interesting trend has been the wide spread use of connections based on standards that were never intended for use as a local area network—namely the RS-232 electrical standard. Most of the connections from Cromemco machines are via RS-232 connections.

This standard was originally developed by the phone company for data connections to data communications equipment. Manufacturers like Cromemco used this standard because virtually all peripheral devices were designed around it. Hence terminals and printers were readily available.

But the RS-232 standard is really an electrical standard defining the signal levels present. It is almost always associated with asynchronous (async) or synchronous (sync) data communications, usually ASCII or EBCDIC data. It has continued to be popular for peripheral device connection. But as the data transfer from system to system has become a bigger issue, these connections have been put to work pumping data from one system to another. The reason being that it is one of the only standard ports that crosses all lines—

micro, mini, and mainframes—within all manufactures.

Most systems adhered to the standard and used the phone data transfer systems defined by Bell Labs (back when 1 phone = 1 phone company). To use this connection for other types of data connections and transfers you have only to develop usable software and take advantage of the ready-to-connect ports.

Typical data rates of yesterday were slow by today's standards. This was because the data was almost always transferred over long distances using telephone circuits (remember the phone company developed the standard). The terminal was sharing a large central mainframe and worked only on dial-up or leased phone lines. There were no work stations or personal computers. The 110 to 300 baud (bits per second) data rates were pushed up to 9600 for devices that were locally attached, i.e., not over phone lines. These devices now commonly run at 19,200 and 38,400 and faster, even over phone lines.

Previously these fast rates often overran a computer's port and thus were not used much. But with the development of faster and cheaper micro processors it became inexpensive to develop dedicated communications processors that could keep up. And with the faster data rates came many other uses. The most unusual was computer interconnection, commonly called LAN: Local Area Networks.

Most of the early devices were non error-correcting in nature. A Telex that was corrupt caused little problem as the reader could usually figure out what the sender intended. Furthermore, with slow baud rates the energy of the sending system remained on the phone line longer, and thus the chances of the receiving unit picking up the information without line noise corrupting it was much better. Again, with low cost micro processors error-correction schemes were built into low-cost modems and data switches using the RS-232 connection.

Higher data rates mean more error-correction overhead. More data transfers of an ongoing nature mean greater dependancy on accurate

TABLE 1

Manufacturer	Model #	Cap.	# of Cyl.	# of Heads	Precomp
Control Data	94155-57	50	925	6	0
Control Data	Wren II	51.5	989 (1/2 ht.)	5	989
Control Data	Wren II	48.0	925	5	925
Control Data	Wren II	67.0	925	7	925
Control Data	Wren II	86.0	925	9	925
Hitachi	DK511-5	50	714	7	256
IMI	5018	20	306	6	214
Fujitsu	M2242AS	55.0	754	7	754
Fujitsu	M2243AS	86.4	754	11	754
Maxtor	XT-1065	67	918	7	918
Maxtor	XT-1085	85	1024	8	1024
Maxtor	XT-1105	83	918	11	918
Maxtor	XT-1140	143	918	15	918
Maxtor	XT-2085	85	1224	7	1224
Maxtor	XT-2140	150	1224	11	1224
Maxtor	XT-2190	190	1224	15	1224
Micropolis	M1304	50	830	6	829
Micropolis	M1325	85.3	1024	8	1024
Micropolis	M1375	?	1018	8	1018
Microscience	HH-325	25.52	612	4	612
Microscience	HH-725	25.52	612	4	612
Microscience	HH-1050	53.33	1024	5	1024
Miniscribe	6053	53	1024	5	512
Miniscribe	6053	85	1024	8	512
Quantum	Q250	?	823	4	823
Quantum	Q280	?	823	6	823
Quantum	Q160	?	823	12	823
Rodime	50240	25	640	6	640
Rodime	201E	13.33	640	2	640
Rodime	202E	26.67	640	4	640
Rodime	203E	40.0	640	6	640
Rodime	204E	53.34	640	8	640
Seagate	ST125	25.6	615	4	615
Seagate	ST138	32.3	613	4	613
Seagate	ST138R	38.4	615	4	615
Seagate	ST157R	57.7	615	6	615
Seagate	ST212	12.8	306	4	128
Seagate	ST213	12.8	615	1	300
Seagate	ST225	25.6	615	4	300
Seagate	ST238R	38.4	615	4	615
Seagate	ST251	51.2	820	6	820
Seagate	ST251R	51.2	820	4	820
Seagate	ST277R	76.9	820	6	820
Seagate	ST412	12.8	306	4	128
Seagate	ST419	19.1	306	6	128
Seagate	ST425	25.52	306	8	128
Seagate	ST4026	25.6	615	4	300
Seagate	ST4038	38.2	733	5	300
Seagate	ST4051	50.9	977	5	977
Seagate	ST4053	53.3	1024	5	1024
Seagate	ST4077R	80.0	1024	5	1024
Seagate	ST4096	96.0	1024	9	1024
Seagate	ST4144R	144.0	1024	9	1024
Shugart	712	10	306	4	200
Tandon	TM-501	6	306	2	306
Tandon	TM-502	12	306	4	306
Tandon	TM-503	19	306	6	306
Tandon	TM-251	6	306	2	306
Tandon	TM-252	13	306	4	306
Vertex	V-150	50	987	5	986

transfers. But the basic setup of the RS-232 connection never changed.

Most companies use async (asynchronous) rather than sync (synchronous) connections for small- and medium-sized computers. This type of connection was made popular because it was simple from a timing standpoint. Synchronous connections needed more complicated hardware and dial-up applications were harder. But asyn-

chronous connections have a greater overhead associated with data transfer—about 20% or more.

Synchronous connections are usually time-dependent and depend on certain things happening within given time frames to work properly. But the overhead is lower, and thus more data is carried in a given time. It is also inherently error-correcting, and is most often used in remote controllers that

are controlling a number of remote terminals and printers. We don't see much of this protocol in the Cromemco world. Improvements in async error correcting and faster baud rates have removed some of the synchronous edges and caused asynchronous applications to grow.

Interestingly, when IBM developed the PC and started the PC revolution they chose the standard async/ASCII used by all other makers of small computer systems rather than their own sync/EBCDIC. This again was because low-cost async/ASCII devices were around and they needed devices that were inexpensive to compete with their very expensive terminal products. But IBM also purchased most of the original technology, both hardware and software, rather than creating it through their traditional channels and thereby purchased technology based on industry standards.

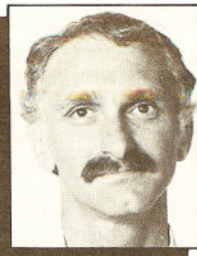
I stated in the beginning that RS-232 was an electrical standard. Why all this discussion about sync, async, ASCII, and EBCDIC? Very often when a company talks about RS-232 they really mean async/ASCII. That's not part of the RS-232 standard. But it is by far the most common use of RS-232 in mini and micro systems. Basically it is a standard of distances that are under a few hundred feet. It also defines the line voltages, which are usually in the +/-15 volts DC range.

Data rates, while not part of the standard, were originally in the 50 to 9600 baud range, but can now exceed 115,000 baud and higher in some applications. I expect to see this faster still. Originally it connected terminals to remote systems but now connects peripherals to computers locally and connects computers to computers, even in the same room. It is even used in sophisticated data PBXs such as a campus phone system with switch connecting where a user can be connected to any computer resource attached to the PBX system. And now it even provides connections over dial-up lines to virtually every corner of the world.

So the lowly RS-232 standard reigns. From a simple remote device connection standard now to the worlds most common computer connection standard. Originally only a voltage standard, now it becomes a common data transfer media. Originally to connect devices to a mainframe, now it is used as a sub-LAN.

But is it the best? Will it continue to be the most common. Are their new demands being placed on these lowly connections? What are LANs (Local Area Networks) and WANs (Wide Area Networks) and sub-LANs? What's happening to networks in general. I'll cover these items next time.





C-10 ENCOUNTERS

C-10 ENCOUNTERS is a regular column directed to users of Cromemco's personal computer, the C-10. It is edited by Dr. Tom Beer, of Applied Environmetrics, located at 118 Gordon St., Balwyn, Victoria 3103, Australia. Dr. Beer can be reached by phone during business hours at (03) 817-2571. Submit editorial directly to Dr. Beer.

Approximately once a year, I presume in celebration of the anniversary of its purchase, my disk drive plays up. I had finished typing my previous *I/O NEWS* column, but instead of my finished Writemaster file being correctly saved, I found that I had a corrupted directory with a read error at sector 9, track 1, side 0.

If there is a corrupted sector on a disk then the normal way to "fix" it is to fool the operating system into thinking that this sector is not available for use. Normally one creates a directory entry with a name that cannot be deleted and assigns the bad sector to that file. Because CDOS always converts filenames into upper-case, the simplest undeletable filename is one in lower case. This is usually inserted into the directory file SYS.DIR using DEBUG but can be done in other ways. For example, the Fortran IV compiler does not check for upper or lower case and a lower-case filename can thus be opened with a Fortran program. Sbasic will not, however, allow this. But as Fortran will not allow you to assign particular sectors to files (that is one of the many jobs of the operating system) you still need to use DEBUG or CROS on the directory.

If the corrupted sector is slap-bang in the middle of the directory, then you are in real trouble. I was in real trouble. It had happened once before to my wife and there seemed at that time to be no hope of recovery and all her data on that disk (which had no back-up) was lost. I, of course, had a backup so I re-edited the backup file, saved it and ... found that the disk drive chewed up the directory of this disk as well. This meant that I now had two disks that returned a read error in response to the command DIR.

As it takes me an indecently long time to write the C-10 ENCOUNTERS column I had no intention of starting from the beginning. With all my knowledge of disk organization I felt that I should be able to recover my lost file, provided that the directory entry for the file that I wanted was not in sector 9.

My first step was to hunt out my own article on CROS in *I/O NEWS Volume 5, #1*, page 18 and use CROS to read in the directory up to sector 9. Examining the directory using CROS revealed the directory entry that I wanted. Luckily the directory entry was not in sector 9 so that the file could be recovered. The second line of the directory entry of the file that I wanted to recover consisted of the clusters that it occupied on the disk. The numbers were 49, 55 and 56.

Step 1 was then to calculate the track, side and sectors corresponding to these clusters. The article on CROS showed how this can be done and I dutifully continued the method forward; used CROS to set the side, track and sector; read it into memory, examined it and then puzzled as to why the file that I wanted to recover was not the one that I was examining. It finally dawned that the clusters are *hexadecimal* numbers, whereas I had done my counting of clusters in decimal. A recalculation produced:

Cluster	Track	Side	Sectors
49	0Fh	1	9,3,7,2
55	12h	0	1,5,9,3
56	12h	0	7,2,6,A

Step 2 was to initialize a new disk using COPYDISK. This could

have been tricky with a one drive system, because if the drive was corrupted then it would not have initialized properly. For some unknown reason, after having scrunched two of my disks, the disk drive gave me no further trouble.

Anyway, I now run a two drive system so Step 3 consisted of putting the corrupted disk in drive A, putting the new initialized disk in drive B and using CROS to transfer track 0F and track 12 from the old to the new. The sequence of CROS commands that I used are:

```
AS ;sets small floppy disk A
SS 1 ;set side 1
S F ;set track 0F
RD 100 1300 2 ;read disk into memory from 100 to 1300
;starting at sector 2
(0F02 1 1001 1) ;returned by CROS to show it read in from
;track F sector 2 to track 10 sector 1 on
;side 1
BS ;select small floppy disk B
SS 1
S F
WD 100 1300 2 ;write back what you just read into memory
AS
SS 0
S 12 ;side 0, track 12 on disk A set
RD 100 1800 1 ;read it into memory from sector 1
(1201 0 1302 0) ;track 12 sector 1 to track 13 sector 2
;successfully read in
BS
SS 0
S 12
WD 100 1800 1 ;track 12 written to disk in B
```

The read disk commands are a bit conservative and have read in more of the corrupted disk than was strictly necessary to resuscitate only the file that I wanted.

The final step required me to insert a directory entry onto the new disk in order to tell the operating system that there was a file to be found at clusters 49,55 and 56. This could have been done with CROS but I find it easier to use DEBUG.

Miss Kathy Baulch, whose correspondence I mentioned in my last column, also mentioned that she has had "no success in undeleting using CROS Version 03.07, which came with Release 5. Typing AS after the semicolon prompt only produces a question mark." I find it very puzzling that she is unable to select a disk drive in CROS and suspect that it may have something to do with her non-standard disk drive arrangement. She has a double disk drive unit in a side-by-side metal box with only one connection to the computer, and with its own power supply. The standard C-10 two disk drive system consists of two identical CFD drives with their cables piggy-backed into the computer. The one connected directly to the computer becomes drive A, the one being piggy-backed is drive B. Power is supplied to the drives directly from the computer and neither needs a separate power supply.

In *I/O NEWS Volume 5, #3* I had a super-challenging test comprising 4 questions. The first of these asked for a description of any way of returning from CDOS to CROS without turning off the machine.

The way that I had done it was to use a piece of information

tucked away in Appendix J of the *C-10 Technical Manual*. The pointer to the CROS service routine is displaced 16 from the value returned in the BC register after CDOS system call 81h. I then wrote a program that:

1. Loaded 81h in the C register.
2. Called CDOS (i.e. CALL 5). Under CDOS 2.65 this returned E981 in the BC register.
3. Added 16 (10h) to the BC register. This gave E991.
4. Loaded 6 into the A register (This tells the service routine to connect to an external system).
5. Memory location E991 had the byte FF in it. Memory location E990 had the byte 55 in it. These two bytes constitute the address FF55.
6. The program jumped to the address pointed to by the BC register. (i.e. Under CDOS 2.65, the address E991 points to the address FF55).

When running the above program, the C-10 ponders a goodly while then returns with a table of settings for external connection. Pressing RETURN then produces the CROS prompt.

I gave myself one-half of a mark for the above solution. It is inelegant and I am not sure if it has properly returned me to CROS. If I issue the command B (for Boot) after the CROS prompt my system does not boot. I thought that this was because the disk drive head had not been properly positioned over the boot track, but even positioning it there failed to produce a successful boot.

G. Reynolds of Helderberg College in South Africa came up with a far more elegant solution. He cites Cromemco Application Note 023-9102 on I/O port assignments. This note, of which I have a copy in my files, is identical to Appendix K of the C-10 technical manual, and since February 1984 forms Appendix H of the users manual. I had seen all these documents but had failed to realize, as Mr. Reynolds points out that "... outputting a 1 to port 40h switches in ROM in address space 4000h to BFFFh, which includes CROS starting at address 8000h. From there, the solution is simple. The following three Z80 assembly instructions do the job:

```
LD A,1
OUT 40H,A
JP 8000H
```

In hexadecimal code that translates to: 3E 01 D3 40 C3 00 80.

This code must reside below 4000h in memory. It can be poked out with BASIC and then executed as a subroutine (from which control will not return), or written as a .COM file, either with DEBUG or the assembler and linker or loader. I used DEBUG to create the code and the file SYSRESET.COM containing it. Note: Do NOT single step through this code in DEBUG! You'll hang the system!

When this code is executed, the power-on sequence of the machine is invoked, the screen is blanked, the bell rings, and after a pause while memory is tested, the system goes through the normal boot load sequence, looking for a disk and trying to boot CDOS if it finds one. But as soon as you hear the bell, press ESCAPE, and presto!, you're in CROS with the ';' prompt. From there, you can do anything."

Mr. Reynolds continues by pointing out a peculiarity of the C-10. "Cromemco's documentation says that the C-10 cannot read single-density diskettes. In fact, it can, though it cannot format them. It can write them too, but here's the catch. If you write to a single-density diskette from a location in memory that lies over CROS, the system will switch in ROM during the write, and what is written will be the CROS code itself, instead of the contents of RAM memory. As soon as the write completes, RAM is switched back in. Nothing is lost in memory, but you can't get it to the disk. This is transparent to all programs, including DEBUG. I would guess that CDOS is using hardware assistance by calling on CROS to do the job, and that is the consequence. Not all of ROM is switched in, or at least it is only switched in if the data overlays CROS beginning at 8000h, so its not quite that simple. (This happens on machines

that don't have Release 5 installed, with CDOS itself in ROM. I don't know if Release 5 changes anything)."

The remaining questions of my super-challenging quiz remain unanswered (and unanswerable?) to date. Question 2 wondered how one could get Esc "G" to read the character at the cursor location. The nearest I got to this was a letter from Ing. Alejandro Sotelo pointing out that an Esc "O" sequence will read the clock on a C-10 (That's Capital O as in Ocean, not zero). This, in fact, is true only with Release 5 CDOS (CDOS 3.07) and higher. After sending the sequence, the C-10 returns a string containing most of the 25th line—the status line—including at the end of it the time. The following Sbasic program illustrates this:

```
10 Dim Stat$(36)      :Rem Length of the status line
20 E$ = Chr$(27)       :Rem Define the Escape code
30 @E$;"O"            :Rem Send the Esc"O" sequence
40 Get\OStat$         :Rem Capture the line
50 Time$ = Stat$(28,36) :Rem We only want the time
60 @Time$             :Rem Print the time
```

Ing. Sotelo points out that the performance of this program is variable. The string sent out by the C-10 should always start with a ^B ^O, but sometimes there is only one or no ^B. This causes problems.

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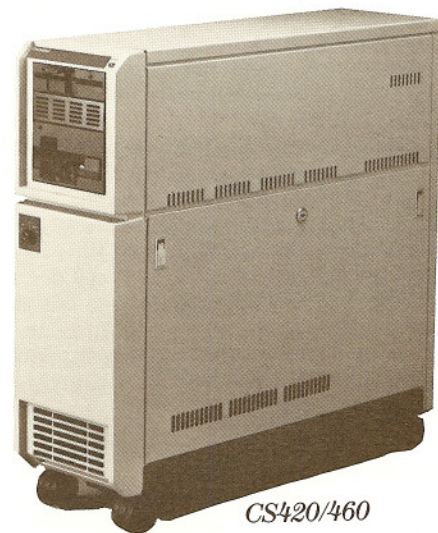
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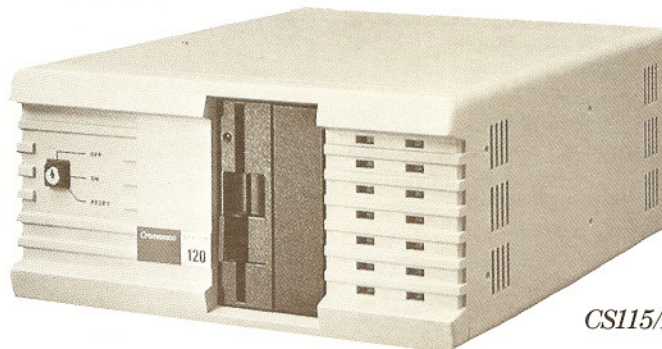
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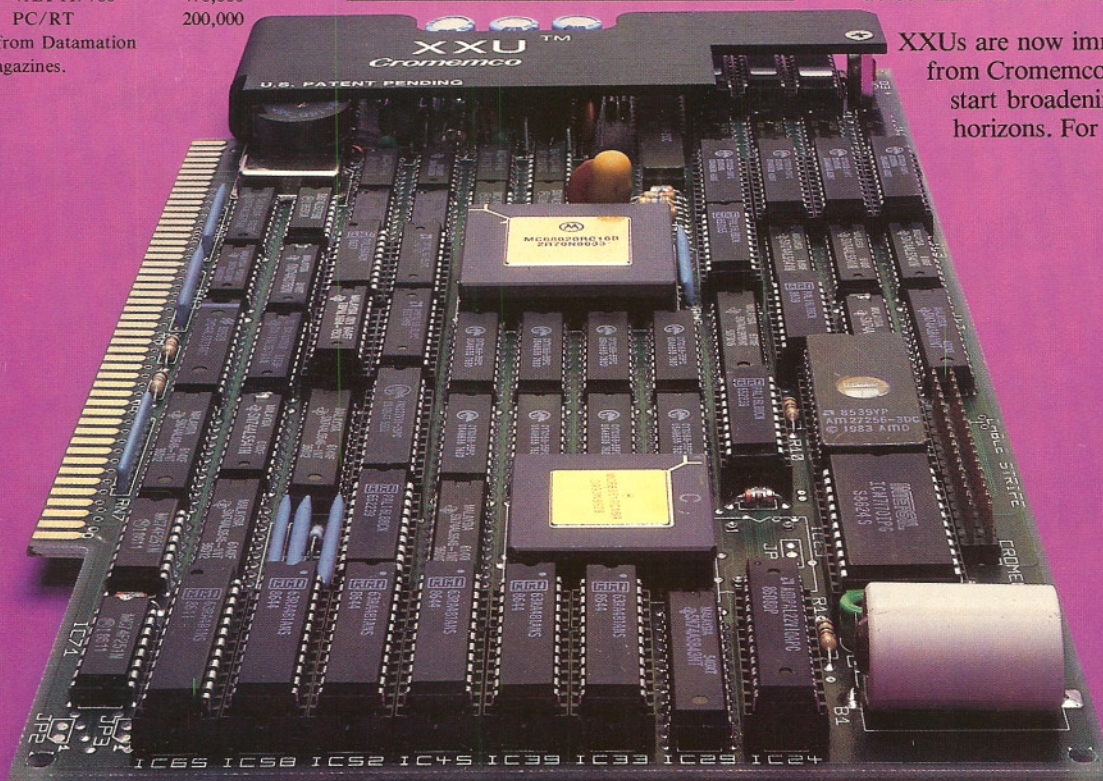
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